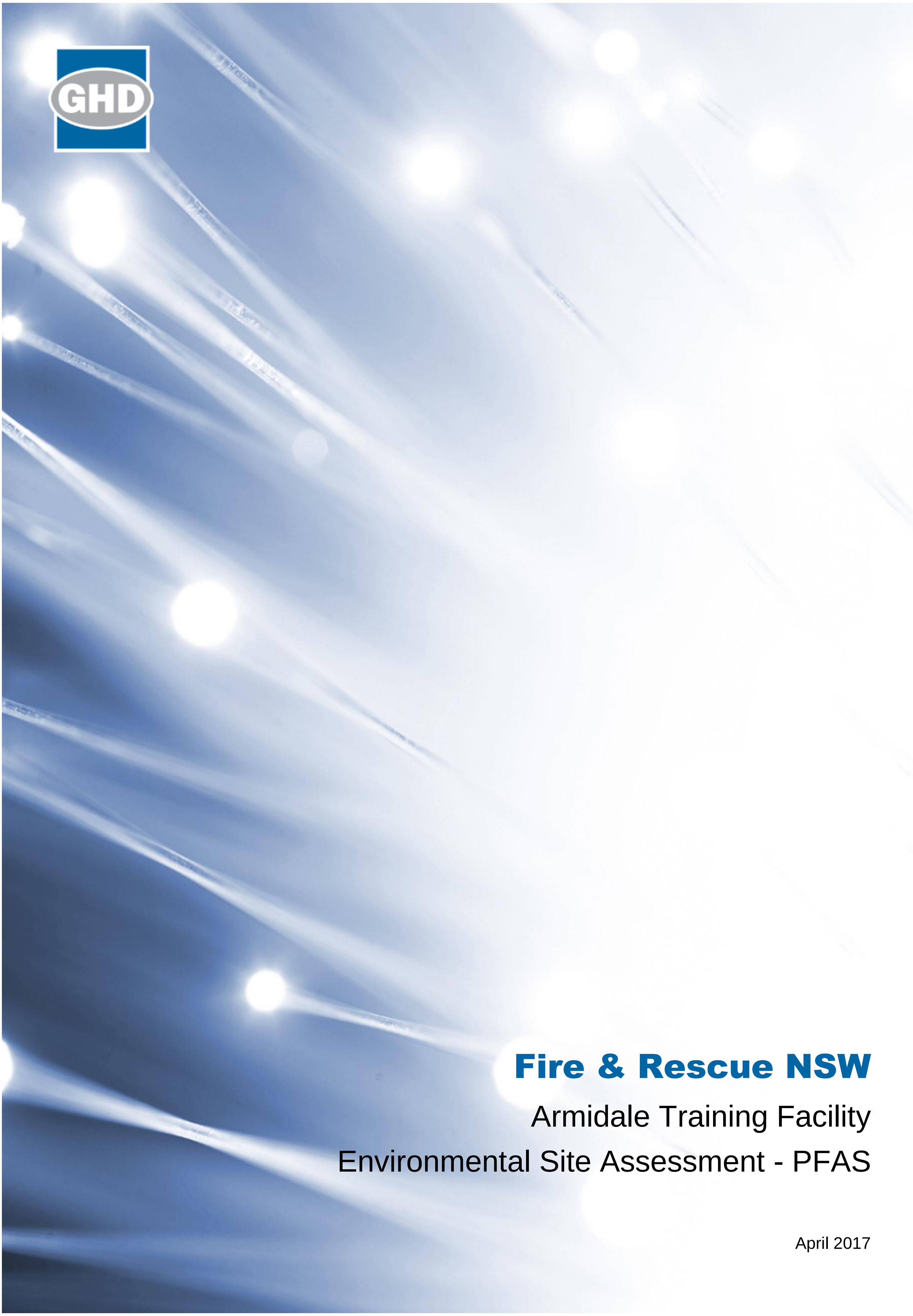

Fire & Rescue NSW

Armidale Training Facility

Environmental Site Assessment - PFAS

April 2017

27 April 2017

Sally Langley
Fire & Rescue NSW
PO Box A249
Sydney South NSW 1232

Our ref: 21/25583
Your ref:

Dear Sally

Fire and Rescue NSW - Armidale Training Facility Environmental Site Assessment - PFAS Addendum 1

1 Introduction

In November and December 2016, GHD completed a combined preliminary and detailed site investigation at the Armidale Training Facility located at 2-16 Mann Street Armidale, NSW 2350 (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 – Armidale 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 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)[1] which are based on the enHealth (2016)[2] recommendations.

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[1] 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)

[2] 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 µg/kg/d	**0.02 µg/kg/d**	1.5 µg/kg/d	**0.16 µg/kg/d**
Drinking water quality guideline	0.5 µg/L	**0.07 µg/L**	5 µg/L	**0.56 µg/L**
Recreational water quality guideline	5 µg/L	**0.7 µg/L**	50 µg/L	**5.6 µg/L**

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 four on site samples (MW01 to MW04) and one off-site sample (GW977466).	Eight surface water samples were collected including four samples (SW01 to SW04) within the bounds of the training facility and four samples (SW05 to SW08) collected from surface water receptors down-gradient of the site.
Review of data for protection of drinking water quality	With the exception of one location (MW04), all other locations reported concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of drinking water quality.	With the exception of one location (SW08), all surface water samples reported concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of drinking water quality. One location (SW01) reported a concentration of PFOA above the FSANZ (2017)

Summary information	Groundwater Data	Surface Water Data
		screening value for the protection of drinking water quality.
Review of data for protection of recreational water quality	One on-site location (MW03) reported a concentration of PFOS/PFHxS in groundwater above the FSANZ (2017) screening value for the protection of recreational water quality.	With the exception of one location (SW08), all surface water samples reported concentrations of PFOS / PFHxS 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):

- Two additional groundwater locations reported concentrations of PFOS / PFHxS above the screening criteria for the protection of drinking water (MW02 and GW977466). One groundwater sample collected on-site (MW03) now reports concentrations of PFOS and PFHxS above the screening criteria for the protection of recreational 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.
- All surface water samples previously reported PFOS and PFHxS concentrations above the nominated enHealth (2016) screening values for the protection of drinking water. One surface water location (SW01) reported a concentration of PFOA above the screening criteria for the protection of drinking water. The revision to the FSANZ (2017) guidelines does not impact on the overall interpretation of this data.
- Five additional surface water samples reported concentrations of PFOS / PFHxS above the screening criteria for the protection of recreational water quality (SW02, SW03, SW05, SW06 and SW07). 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

Hallchurch

Jacqui Hallchurch
Principal Environmental Scientist
02 9239 7046

Executive summary

GHD Pty Ltd (GHD) was commissioned by Fire and Rescue NSW (FRNSW) to undertake a combined preliminary and detailed site investigation at a land parcel identified within Lot 1 and Lot 2 DP 1068131, located at 2-16 Mann Street Armidale, NSW 2350.

The area 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 (PFAS) including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

The property is owned by Armidale Dumaresq Council and used for a number of purposed including the Armidale traffic education centre' and the NSW Rural Fire Service. A portion of the property (the majority of Lot 1 DP 1068131) is currently leased by FRNSW for use as a firefighting training facility, but it is understood that FRNSW also uses other portions of the wider training facility. The site investigation area includes the wider training facility as well as the FRNSW site. (Figure 1, Appendix A). Investigation locations outside of the wider training facility are henceforth considered off-site.

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 (specifically those involving PFAS) in the FRNSW site and wider training facility area.

The scope of work comprised:

- Drilling and installation of four groundwater monitoring wells (MW01 to MW04) and twelve soil bores (SB01 to SB12)
- Collection of 17 sediment samples (SS01 to SS17) and eight surface water samples (SW01 to SW08).
- A groundwater monitoring event (GME) of the four new groundwater wells and one private off-site groundwater bore.
- Laboratory analysis of selected soil, sediment, surface water and groundwater samples for chemicals of potential concern (COPC)
- Laboratory analysis of a retrieved section of concrete for COPC
- Laboratory analysis of a selection of soil samples for Australian standard leaching procedure (ASLP) and toxicity characteristics leaching procedure (TCLP)

The following conclusions were made:

- The inferred groundwater flow was in a northerly direction.
- The concentration of PFAS in soils and sediments were low with the results generally being less than the laboratory limit of detection and/or several orders of magnitude below the nominated investigation levels based on direct contact under residential and commercial/industrial land use scenarios. No off-site soil bores report detects of PFAS. Risks associated with direct contact or accidental ingestion of PFAS impacted soils is therefore considered low. However, the presence of PFAS in soils represents an on-going source and risk to groundwater and surface water receptors.
- 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.
- The western training area on the FRNSW site (including the soils and associated retention basin) is likely to be the primary source of PFAS impact, which is migrating off-site to residential/commercial properties as well as to the local groundwater.
- PFAS was detected in the private groundwater abstraction bore, north of the site, in concentrations greater than the LOR but less than the adopted drinking water guidelines. The extent of the groundwater plume down gradient of the site is not fully delineated.
- 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. This should include investigation into how often the final surface water dam of the unnamed tributary/ drainage line (SW07) would over top and flow into Dumaresq Creek.
- 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.
  - Removal of water in the on-site dams and the three neighbouring residential properties and consideration of options to either remove impacted sediments or re-line the dams to prevent further contact with PFAS impacted sediments.
  - Drainage channels between the dams could be cleared out to remove soils and sediments which are likely to act as potential leaching sources.
  - 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 off site investigation to assess whether impacted groundwater is migrating towards other potential abstraction points down gradient of the site.

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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Appendices

1. Introduction

GHD Pty Ltd (GHD) was commissioned by Fire and Rescue NSW (FRNSW) to undertake a combined preliminary and detailed site investigation at a land parcel identified within Lot 1 and Lot 2 DP 1068131, located at 2-16 Mann Street Armidale, NSW 2350.

The area 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 (PFAS) 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. The findings of the PSI are reported in:

- GHD (2016) *Armidale PFAS Investigation, Preliminary Site Investigation and Sampling and Analysis Quality Plan*. August 2016.

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

1.1 Background

The property is owned by Armidale Dumaresq Council and used for a number of purposed including the Armidale traffic education centre' and the NSW Rural Fire Service. A portion of the property (the majority of Lot 1 DP 1068131) is currently leased by FRNSW for use as a firefighting training facility, but it is understood that FRNSW also uses other portions of the wider training facility. The site investigation area includes the wider training facility as well as the FRNSW site. (Figure 1, Appendix A). Investigation locations outside of the wider training facility are henceforth considered off-site.

The area of the wider training facility is approximately 200,000 m^2, and the FRNSW site is approximately 15,500 m^2. The wider training facility is bound by rural residential properties to the north, east and west, and vacant land to the south.

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 wider training facility and have requested further investigation to understand potential contamination issues be undertaken by FRNSW.

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 (specifically those involving PFAS) in the FRNSW site and wider training facility area.

1.3 Scope

The scope of work comprised:

- Preparation of a 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 four groundwater monitoring wells (MW01 to MW04) and twelve soil bores (SB01 to SB12)
- Collection of 17 sediment samples (SS01 to SS17) and eight surface water samples (SW01 to SW08).
- A groundwater monitoring event (GME) of the four new groundwater wells and one private off-site groundwater bore.
- 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 and silicon in soils and sediments.
  - PFAS, TRH, BTEXN, PAH and heavy metals (standard laboratory limit of reporting), major ions and total dissolved solids (TDS) in groundwater and surface water.
- Laboratory analysis of a retrieved section of concrete for COPC
- Laboratory analysis of a selection of soil samples for Australian standard leaching procedure (ASLP) and toxicity characteristics leaching procedure (TCLP)
- A quality control and quality assurance (QA/QC) program
- Surveying of newly installed wells.
- Preparation of this detailed site investigation report

1.4 Limitations

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

2. Site description

2.1 Site identification

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

Table 2-1 FRNSW site identification summary

Information	Details
Street Address	2-16 Mann Street, Armidale NSW 2350
Lot and DP number	Portion of Lot 1 DP 1068131
Site Area	Approximately 15,500 m^2
Local Government Area	Armidale Regional Council
Local Land Use Zoning	SP2 – Infrastructure: Emergency Services Facility & Educational
Current Land Use	Training facility
Ownership	Land parcel owned by Armidale Regional Council. A portion of the property is leased by FRNSW for use as a training facility. The lease area has been occupied by FRNSW since 1997.

2.2 Surrounding land use and zoning

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

Table 2-2 Description of land use surrounding FRNSW site and respective zonings

Orientation	Description of Surrounding Land Use	Zoning (Armidale Dumaresq LEP 2012)
North	Residential properties with small quantities of livestock.	R1 – General residential
East	Residential properties with small quantities of livestock.	R5 – Large lot residential
South	The skid pan used by the Rotary club and the site. Followed by residential properties.	RE1 – Public recreation IN2 – General industrial R5 – Large lot residential
West	Council soil stockpiling, Rural Fire Services and residential	R1 – General residential RE2 – Private recreation

2.3 Site environmental setting

2.3.1 Topography

The wider training facility has an elevation of approximately 990 m Australian Height Datum (AHD), according to *NSW Globe* from Land and Property Information. The regional topography appears to gently fall to the north from the FRNSW site towards Mann Street and then toward the Dumaresq Creek.

2.3.2 Soils

General

According to eSPADE from Office of Environment & Heritage, the wider training facility and FRNSW site is within the Kellys Plains ‘kp’ soil landscape. The Kellys Plains soil landscape has the following characteristics:

- **Landscape:** gently undulating lower slopes, footslopes and colluvial fans on basalt and basalt-related colluvium and some other sediments (Armidale Beds/Sandon Beds). Local relief mostly 0–30 m, slopes 1–8%, elevation 960–1210 m. Broadly concave to flat transferral slopes. Extensively cleared open woodland.
- **Soils:** moderately deep, deep (>80 cm) to occasionally very deep (>150 cm), moderately well drained Haplic Eutrophic Black and Red Chromosols and Ferrosols (Chocolate Soils) are widespread. Yellow and Grey Chromosols (Lateritic Podzolic Soils) occur in some areas in association with metasediments. Black Vertosols/Black Dermosols (Black Earths/Weisenbodens) occur on the sometimes flatter, lower portions of slopes. Minor Ferrosols/Dermosols (Krasnozems) occur on some upper footslopes.
- **Limitations:** mass movement (localised), productive arable land (with appropriate land management techniques), high run-on, sheet erosion risk, gully erosion risk, engineering hazard, rock outcrop (localised), dieback. Stoniness (localised), low wet bearing strength (localised), high organic matter (localised), acidity (localised), high shrink-swell potential, slow permeability (localised), high permeability (localised).

Acid Sulphate Soils

The acid sulphate soil class is Class Bn(p4) (ASRIS, 2013), which indicates a low potential for the presence of acid sulphate containing soils. There are no other soil classes located within 500 m of the wider training facility.

2.3.3 Hydrology

Surface water flow is expected to follow the local topography on the FRNSW site and flow north. Dial before you dig underground utilities information did not provide an indication of stormwater infrastructure through the FRNSW site. However, it appeared during the site visit that the majority of onsite drainage was aboveground in man-made channels.

The closest water bodies are Black Gully and Dumaresq Creek, which are both located approximately 1 km away to the north and north east of the FRNSW site. The FRNSW site does not appear to be within the Black Gully catchment, which is a tributary of Dumaresq Creek. However, there is a small tributary (drainage channel) that flows through the wider training facility and enters the Dumaresq Creek approximately 1 km north of the property.

2.3.4 Geology

The 1:250,000 geological sheet series for Dorrigo-Coffs Harbour suggests that regional geology of the area includes Sandon Beds from the Carboniferous Period. Sandon Bed consists of greywacke, argilillite, chert, jasper and basic volcanics. Tertiary Cainozoic Group sediments that include theoleiitic and alkaline basalts with minor trachyte and dolerite, conglomerate, greybilly, sandstone and claystone are located immediately to the south of the area.

2.3.5 Hydrogeology

Existing Groundwater Bores

GHD conducted a review of existing groundwater borehole records using the NSW Department of Primary industries, Office of Water, groundwater database. The search was conducted to identify registered groundwater boreholes in close proximity to the site and to record information such as use and standing water level. As shown in Table 2-3, only one groundwater bore was identified within a 500 metre radius of the FRNSW site. Other bores with-in a one kilometre radius, or potentially down hydraulic gradient of the wider training facility have been included in Table 2-3.

Table 2-3 Review of existing groundwater data

Borehole ID	Authorised purpose	Property owner or address	Depth (m)	Standing Water Level (m)	Approx. Distance from Site
GW966477	Stock (converted)	5 Mann Street, Armidale	20.0	6.0	320 m north
GW047498	Irrigation, domestic, industrial (active)	Pembroke Caravan park	45.7	3.7	640 m north west
GW301016	Stock, Domestic (active)	-	30.5	9.0	833 m west
GW033493	Domestic (active)	-	50.3	-	775 m north-east
GW060774	Stock, domestic (active)	-	52.0	-	1000 m north-east
GW058964	Stock, domestic (active)	-	32.7	-	1050 m north-east
GW306198	Domestic (active)	Carinya, 312 Grafton Road, Armidale	94.2	4.9	1240 m north-east
GW965655	Domestic (active)	Lot 22, 56 Gungurru Road, Armidale	86.6	18.3	1150 m east
GW300073	Domestic (active)	Prater's 54 Gungurru Road, Armidale	42.0	-	1290 m east
GW044994	Domestic, stock (active)	Edmonds' 312 Grafton road, Armidale	41.1	-	1330 m east

Groundwater risk map

The *1:2,000,000 Groundwater in New South Wales, Assessment of Pollution Risk Map* indicates the area is likely to be underlain by fractured mainly igneous and metamorphic rocks with a low to moderate potential for groundwater movement. Groundwater salinity is expected to range from 0 – 1000 mg/L, which is considered suitable for stock, domestic and some irrigation purposes.

Work summary reports from the registered groundwater bores state that the groundwater is considered suitable for potable use.

2.3.6 Surface water and drainage

An unnamed side tributary of Dumaresq Creek runs through the wider training facility. The tributary enters in the south-eastern portion of the area and exits in the north of the wider training facility.

Surface water features within the wider training facility

There are several drainage lines through the wider training facility as shown on Figure 2, Appendix A. All the drainage lines join the unnamed tributary along the northern boundary of the wider training facility, and is directed underneath Mann Street before entering a neighbouring property on the northern side of Mann Street.

In addition to the tributary which bisects the wider training facility, surface water bodies relevant to the site include:

- Surface water retention dam located to the north of the training area on the FRNSW site.
- Surface water retention dams located along the tributary line in the wider training facility area.
- Retention dam to the north east of the skid pan in the wider training facility, receiving water from the skid pan and recycling its use for training purposes on the skid pan via a pump and sprinkler system. Excess surface water run off is re-captured in the retention pond.

Off-site surface water features

Hydraulically down gradient of Mann Street, surface water flows to a surface dam located within a residential property (3-5 Mann Street). The dam is located approximately 50 metres from the street. A drainage line continues from the dam, flowing north through the neighbouring properties to another surface water dam located on 76-94 Grafton Road. The drainage line flows to a culvert before being directed underneath Grafton Road, beyond which the drainage line continues to flow along private properties.

The drainage line north of Grafton Road appears to have been subject to historical alignment, including the removal of two surface water dams.

The drainage line eventually drains to a large dam. When overflowing, the dam would likely drain into Dumaresq Creek, approximately 900 metres north of the site.

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 details including the layout and key features.

Table 2-4 Key features

Item	Summary observations
Fencing and access	A main cyclone fence encompasses the wider training facility. A second, inner fence delineates the FRNSW site. The FRNSW site is secure access, for authorised entry only. These boundaries are presented in Figure 2, Appendix A.
FRNSW site features	Key features of the area occupied by FRNSW include: - Administration buildings and site offices. - Main fire training area located to the west of the main driveway to the site. The fire training area comprises hardstand of concrete and asphalt. The concrete was reportedly laid approximately 5 to 10 years ago.

Item	Summary observations
	- Second fire training area located towards the south eastern corner of the FRNSW property. Second training ground reportedly only used for water based training activities. - Surface water retention ponds, receiving water draining from the fire training areas and skid pan.
Key features of the wider training facility	Key features of the wider training facility, outside of the FRNSW fenced area, include: - Skid pan, located to the south of the FRNSW site. AFFF was reportedly historically used on the skid pan - Soil stockpiles located to the west of the FRNSW site. Material reportedly associated with roadworks and comprises clean materials - NSW Rural Fire Service located to the west of the FRNSW site - Surface water retention pond, receiving and recycling water from the skid pan.

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 area 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 perfluorooctane sulfanoate (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 and instead, the product was reportedly brought onto the FRNSW site for specific training purposes as required. 20L containers of AFFF concentrate were reportedly 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 the FRNSW site, wider training facility and the surrounding land, and this requires further investigation.

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 routs 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 site are identified as the lateral extent of the groundwater monitoring bore network as shown in Figure 3A and Figure 3B, Appendix A, and down to a depth of approximately 18.0 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 wider training facility and identified off-site receptors
Potential constraints on data collection	Access to the proposed sampling locations may be restricted by services, buildings, and infrastructure, as well as access to private land at off-site monitoring locations

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 F.

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

Table 4-1 Groundwater well installation methodology (including soil and soil bore sampling)

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 till refusal and was then followed by air hammer.
Bore logging	All field observations and subsurface conditions were recorded on lithological logs (Appendix D).
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 D. PID calibration data is presented in Appendix H.
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 will be submitted for laboratory analysis of 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.
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 E.
QA/QC	A QA/QC sampling procedure was implemented and further details are described in Section 3 and Appendix F. QA/QC sampling included two intra-laboratory duplicate samples, two inter laboratory duplicate sample two field rinsates.

Item	Description
Well construction	Wells were installed with the following general characteristics: - 50 mm polyvinyl chloride (PVC) Class 18 blank and screened casings - 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 - 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 - Monitoring wells were finished with trafficable gatic covers and concrete
Development	Well development occurred following installation using bailers until: - No further noticeable sand or silt was recovered - The water was relatively clear when removed from the well - All water was removed from the well
Surveying	Following well installation, all newly installed were surveyed by a registered surveyor. The survey report for the wells is provided in Appendix G.
Waste disposal	Soil cuttings and purged groundwater is currently stored in two 205 L drums on the FRNSW site for disposal of to a licenced waste facility. Waste disposal documentation will be provided in the following stages of work.

4.3 Sediment sampling

Table 4-2 Sediment sampling methodology

Item	Description
Date of fieldwork	28 November - 2 December and 8 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 E).
Decontamination	Prior to and following the collection of each groundwater sample, all non-disposable sampling equipment underwent decontamination including: Washing of equipment with phosphate-free detergent (Decon Neutracon) Rinsing of equipment with fresh water
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.
Quality assurance and quality control (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	8 December 2016
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	ASTM D6771–02, Standard practice for low-flow purging and sampling for wells and devices used for groundwater quality investigations, ASTM International 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) Australian Standard 5667:1998 Water Quality – Sampling, Part 11: Guidance on the Sampling of Groundwaters (AS 566.11:1998)
Gauging	Four on-site monitoring wells (MW01, MW02, MW03 and MW04) and one off-site private groundwater bore (GW977466) 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	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. Field sampling sheets are presented in Appendix C.
Sampling	All monitoring wells were low flow sampled using a micropurge pump.
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 E).
Decontamination	Prior to and following the collection of each groundwater sample, all non-disposable sampling equipment underwent decontamination including: Washing of equipment with phosphate-free detergent (Decon Neutracon) Rinsing of equipment with fresh water
Sample analysis	All groundwater samples were submitted for laboratory analysis of COPC including PFAS, TRH, BTEXN, PAH and heavy metals (standard laboratory limit of reporting), major ions and total dissolved solids (TDS). Laboratory results are summarised in Appendix B and certificates of analysis and COC included in Appendix E.
Quality assurance and quality control (QA/QC)	QA/QC sampling included the collection of one inter-laboratory duplicate sample.
Waste disposal	Purged groundwater was transferred into 205 L sealed drums which are currently stored on the FRNSW site for disposal of to a licenced waste facility. Waste disposal documentation will be provided in the following stages of work.

4.5 Surface water sampling

Table 4-4 Surface water sampling methodology

Item	Description
Date of fieldwork	28 November, 1 and 8 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 C.
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 will be 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, TDS and major ions.
Quality assurance and quality control (QA/QC)	QA/QC sampling included the collection of one intra-laboratory duplicate sample.

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 PFAS, New South Wales Environment Protection Authority* (NSW EPA)

For the purpose of the assessment of data collected from the 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 comes to light.

5.2 Rationale for assessment criteria

The assessment criteria were selected to allow decisions to be made for the following identified receptors (from Section 2.1):

- FRNSW and wider training facility commercial workers associated with the council yards and Rural Fire Service.
- Potential intrusive maintenance workers on and off-site
- 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/stock use groundwater resources.
- Terrestrial and ecological receptors on and off-site in land based ecosystems and surface water bodies (including those recharged by groundwater).

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 the FRNSW site, however one registered groundwater bore was located within a 500 metre radius of the FRNSW site, registered for stock use. Considering that there is no specific stock use criterion available, and that there is potential for the groundwater to be used for domestic potable use, drinking water criteria are considered appropriate 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). Whilst the receiving ecosystem from the FRNSW site is not considered high conservation value, 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.

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 on 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 that a separate water assessment has been included in the scope of works for these investigations.

In accordance with the technical guidance note prepared by EnRisk (2016), the Australian Standard Leachate Procedure (ASLP) criteria for soil/sediment leachate assessment adopted for the purpose pf this assessment is 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, therefore 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 - freshwater	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

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
Health Based			
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.
Ecological			
National parks/areas with high ecological values	6.6 mg/kg (PFOS only)	1 mg/kg	Published guideline values unavailable at the time of preparation of this report. Unpublished value derived DEE – 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)-A and Health screening level (HSL) A; for off-site residential land uses
- CRC Care direct contact HSL-A for off-site residential 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 and surface water

In accordance with NSW EPA (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*, contaminants identified in groundwater will be 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 ADWG 2015. 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 fresh water system (Dumaresq Creek, located approximately 1 km north of the FRNSW site), NEPM GILs for fresh 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. HSL D and HSL A for commercial/industrial and residential (vapour intrusion for sand soils, >8 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 – on-site: Human health
- Table A2: Soil analytical results – on-site: Ecological and intrusive maintenance workers
- Table A3: Soil analytical results – off-site
- Table B: ASLP analytical results
- Table C: Groundwater and surface water analytical results

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.

In summary, 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.

6.3 Soil results

Soil was examined by GHD during drilling works at newly installed groundwater wells (MW01 to MW05) and soil bores (SB01 to SB12). Additionally, a sample of concrete was also collected and submitted for laboratory analysis. Descriptions of the lithology including visual and olfactory observations, sample identifications along with the well construction details and elevations are presented in borehole logs contained in Appendix D.

6.3.1 Soil profile

The observed lithology at across the 16 investigation locations completed during this scope of works is summarised in Table 6-1.

Table 6-1 Generalised lithology encountered

Depth range (m)	Lithology
0.0 – 0.3	Gravelly SAND, pale brown (fill)
0.2 - 0.3 to 1.6 - 1.7	CLAY dark brown (natural) - only in SB01 and SB02
0.4 – 1.7 to 1.6 - 2.7	Gravelly CLAY, grey and brown (natural)
1.5 to Not determined	Gravelly and or sandy CLAY (natural bedrock)

6.3.2 Soil analytical results

The soil sampling laboratory results are summarised in Table A1, Table A2 and Table A3, Appendix B and presented in Figure 4A and Figure 4B in Appendix A. Laboratory certificates of analysis are presented in Appendix E.

All soil results were below the nominated screening criteria for all COPC. Concentrations of PFAS in soil samples were generally low, with the concentration of the majority of PFAS analytes below the laboratory limit of reporting (LOR) at each location.

The highest concentration of PFAS was in the concrete sample collected from SB09 on the skid pan in the wider training area (0.406 mg/kg – WA DER sum of total). However, the concentration of PFAS 0.9 m below this point, was at least an order of magnitude lower for all PFAS analytes (WA DER (sum of total) was 0.0025 mg/kg in SB09_0.9-1.0).

6.4 Sediment results

Sediment samples were collected at locations SS01 to SS17. The sediment laboratory results presented in Figure 4A and Figure 4B in Appendix A and Table A1, Table A2 and Table A3, Appendix B. Laboratory certificates of analysis are presented in Appendix E. Given the location and profile of the samples collected, and the general ephemeral nature of the tributary from which the samples were collected, the application of soil screening criteria for initial analysis of the data set is considered appropriate for this investigation.

The following monitoring locations exceeded the NEPM (2013) EIL commercial/industrial assessment criteria for zinc:

- SS01 – located on the FRNSW site
- SS09 (inter-laboratory sample and intra-laboratory sample) - within the wider training facility area

There were no other exceedances of the adopted assessment criteria. It is noted that SS01, SS05 and SS09 each have detects of TRH fractions (greater than C_{10}). The highest TRH concentration was at SS01, with a concentration of C_{16}-C_{34} of 2370 mg/kg.

Concentrations of PFAS in sediments were low and generally below or close to the laboratory limit of reporting. The maximum concentrations reported for PFOS and PFOA in sediments were 0.047 mg/kg (SS08) and 0.002 mg/kg (SS01) respectively. All PFAS concentrations in sediment samples collected both within the wider training facility (including the FRNSW site) and off-site were several orders of magnitude below the nominated investigation levels.

6.5 ASLP analytical results

Nine soil samples and eight sediment samples were submitted for ASLP testing for PFAS, the results of which were compared to the surface water/groundwater criteria multiplied by a dilution factor of 10 (Table 5-2). The samples analysed for ASLP were:

- MW04_1.9-2.0, MW1_0.5-0.6, SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5, SB08_0.4-0.5, SB09_4.9-5.0, SB12_0.0-0.1,
- SS01, SS02, SS04, SS08, SS09, SS11, SS12, SS13, and SS14.

The leachate laboratory results are presented on Figure 5 in Appendix A, and summarised on Table B, Appendix B.

The concentration of PFHxS and PFOS (sum of total) was noted to be at least one order of magnitude greater in the leachate samples than in the original soil/sediment samples. A review of this data against the relevant screening criteria is provided in Sections 6.5.1 and 6.5.2.

6.5.1 Soils

The concentration of PFHxS and PFOS (sum of total) in all nine leachate samples exceeded the nominated leachability screening criteria adopted from WA DER (2017) ecological guidelines for fresh water. Leachate from SB01_0.5-0.6 and SB02_0.9-1.0 also exceeded the adopted criteria for the protection of drinking water.

6.5.2 Sediment

The concentration of PFHxS and PFOS (sum of total) in all eight leachate samples exceeded the nominated leachability screening criteria adopted from WA DER (2017) ecological guidelines for fresh water. However there were no exceedances of the adopted drinking water and recreational guidelines.

6.6 Groundwater and surface water results

6.6.1 Groundwater gauging results

Gauging results are summarised in Table 6-2. 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 6-2 Groundwater Gauging Data

Well ID	Depth of well (m)	Depth to groundwater (m bTOC)	TOC (m AHD)	Corrected groundwater elevation (m AHD)
MW01	16.5	13.985	983.876	969.891
MW02	18.0	14.732	985.469	970.737
MW03	18.0	12.515	982.440	969.925
MW04	18.0	12.802	982.921	970.119

Note: TOC = top of casing

A groundwater contour map showing the interpolated groundwater contours and the inferred groundwater flow direction is presented on Figure 7 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 northerly direction, however GHD notes that this is based on small number of data points.

6.6.2 Groundwater quality

Prior to groundwater sample collection, field parameters and observations were recorded during the purging of the well. Field parameters are summarised in Table 6-3.

Table 6-3 Summary of groundwater quality field parameters

Parameter	Results and Comments
pH	pH range was 6.11 (MW01) and 6.78 (MW03)
Temp (°C)	Temperature was between 17.1°C (MW04) and 18.7°C (MW01)
EC (µS/cm)	EC ranged between 775 µS/cm (MW04) and 1,610 µS/cm (MW01)
DO (mg/L)	DO ranged between 1.85 mg/L (MW03) and 4.80 mg/L (MW01)
ORP* (mV)	Field redox ranged between 249.8 mV (MW04) and 294.5 mV (MW02)

* Oxidation Reduction Potential – field values adjusted by +205

No odours or sheen were noted. The purged groundwater was brown and cloudy.

6.6.3 Analytical results

Samples were collected from four groundwater wells located on the FRNSW site and within the wider training facility; MW01, MW02, MW03 and MW04. Additionally, a sample was collected from one off-site private groundwater bore (GW977466). The groundwater laboratory results are summarised in Table C, Appendix B. Laboratory certificates of analysis are presented in Appendix E.

Groundwater and surface water COPC reported in excess of the nominated screening criteria are summarised in Table 6-4, and are shown on Figure 6 in Appendix A. Further discussion pertaining to these exceedances is provided in Section 7.

Table 6-4 Summary groundwater and surface water exceedances

Analyte	Guideline Exceedance	Monitoring locations
PFHxS and PFOS (sum of total)	WA DER (2017) Drinking water (human health)	MW01, and MW03. SW01, SW02 (primary and duplicate samples), SW03, SW04, SW05, SW06 and SW07
	WA DER (2017) freshwater (ecological)	GW977466, MW01, MW02, MW03 and MW04 SW01, SW02 (primary and duplicate samples), SW03, SW04, SW05, SW06, SW07 and SW08
	WA DER (2017) recreational (human health)	SW01 and SW04
PFOA	(None)	
Copper	NEPM GILs – Fresh water (ecological)	MW01 (primary and duplicate samples) SW02 (duplicate sample), SW03
Zinc	NEPM GILs – Fresh water (ecological)	MW01 (primary and duplicate samples), MW02, MW03, and MW04

The concentration of the following analytes was less than the LOR at all monitoring locations, however the LOR was greater than the adopted criterion:

- Mercury - NEPM GIL freshwater
- Benzo(a)pyrene – NEPM GIL drinking water

The concentrations of TRH, BTEX and PAHs were less than the LOR at each monitoring location, except for TRH C_{16}-C_{34} at SW01 (120 ug/L) which was marginally above the LOR.

7. Discussion

A range of analytes were assessed as part of this investigation in response to EPA requests and guidance. These were compared against the nominated assessment criteria based on the identified potential receptors. However, as outlined in section 1.2, the objective of this report is to assess the potential risks to human health and the environment from potential PFAS contamination related to historic firefighting activities. Minor exceedances of the adopted assessment criteria not related to PFAS contamination have been noted in section 6 (results). Following review of this data, and with consideration of the primary focus of this investigation being PFAS, no further discussion relating to the minor guideline exceedances for copper (groundwater and surface water on site) and zinc (groundwater, surface water and soils on site)

7.1 Soil and sediment

PFAS in soils and sediments – 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 residential and commercial/industrial land use scenarios.

Soil bores within the FRNSW site and wider training facility that are located within the areas know to have been used for firefighting training (Table 2-4) reported detects of PFAS (SB01, SB02 and SB04 from the western training ground on the FRNSW site, and SB08 and SB09 from the skid pan in the wider training facility). Similarly, a piece of concrete from the skid pan and sediment samples from the drainage lines connected to these areas also reported PFAS detects.

No detects of PFAS were reported in samples SB05 to SB07, collected from the general training area located in the south eastern corner of the FRNSW site where it is understood no fire training activities potentially using AFFF have occurred..

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 assessment of soils.

PFAS in soils and sediments – off site

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

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.

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 EnRiskS, 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 and sediment 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/sediments 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 SB01 and SB02 (both located within the FRNSW site on the western training area) were noted to also exceed the leachability screening criteria adapted from the WA DER (2017) Drinking water guidelines. The concentration of PFHxS and PFOS (sum of total) was also noted to be slightly elevated relative to the remaining investigation locations at SB04 and in SS01, SS02 and SS08. Each of these locations are also associated with the western training area on 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.

7.2 Groundwater and surface water

Groundwater contours indicate that the groundwater is flowing generally to the north. This aligns with the expected groundwater flow from the regional topography, geology and hydrogeology (Section 2.3) Without a detailed investigation of the hydrogeology, further conclusions with respect to flow through the fracture system are unable to be drawn.

PFAS has been detected on the FRNSW site, within the wider training facility and off-site in both surface waters and groundwater at concentrations greater than the adopted assessment criteria for the protection of drinking water, ecological, and recreational receptors.

PFAS in surface water – on site

All surface water samples exceeded the WA DER (2017) drinking water and ecological assessment criteria. The highest value (PFAS sum of total WA DER list) was reported in Sample SW01, collected from the surface water retention pond adjacent to the fire training ground (29.1 ug/L) on the FRNSW site. SW03 and SW02, (retention basins in the wider training facility) both report relatively low concentrations of PFAS, indicating that surface water stored in the wider training facility is not likely to be the primary source of PFAS contamination relative to the FRNSW retention pond.

PFAS was detected in surface water drainage on the FRNSW site and in the wider training facility. SW04, located at the point of exit from the wider training facility on the northern boundary, reported the second highest concentrations of PFAS compared to all the water samples collected. The detection of PFAS at SW04 at concentrations exceeding the nominated criteria, shows that migration of PFAS from the FRNSW site to off-site receptors is occurring.

PFAS in surface water – of site

Once off-site PFAS is continued to be detected in the unnamed tributary in the three neighbouring properties down gradient. Attenuation of PFAS in the surface water was noted, and the PFAS concentration decreased with each consecutive down gradient sample in the unnamed tributary (SW05, SW06 and SW07).

Sample SW07 was collected from the last farm dam located before Dumaresq Creek. The results continued to exceed the drinking water and ecological screening criteria for PFOS and PFHxS (sum of total). SW08 was collected from Dumaresq Creek, which was not hydraulically connected to the unnamed tributary and farm dam at the time of sampling. The concentration of all PFAS analytes in SW08 were below the LOR. The farm dam is relatively large in size and roughly 305 m in diameter and 2 m deep. There is no drainage line from the dam to Dumaresq

Creek, however in prolonged rainfall this dam would overflow to the creek. Data collected as part of this preliminary stage of works indicates that the site is not currently impacting Dumaresq Creek, however should the final dam overflow, PFAS from the site in the dam would flow into the Creek.

It is noted that SW04 and SW01 exceed the recreational guidelines for PFHxS and PFOS (sum of total). The location of the sample point SW04 is off-site in a roadside verge (drainage ditch) of Mann Street. This roadway is located on the outskirt of Armidale town and there is no footpath. SW01 is located on a secure access site and is also unlikely to be used for recreation.

PFAS in groundwater – on site

The concentration of PFHxS and PFOS (sum of total) in all groundwater samples exceeded the WA DER (2017) freshwater ecological guidelines, however only MW01 and MW03 exceeded the drinking water criterion. MW03 and MW01 report a concentration of PFAS an order of magnitude greater than MW02 and MW04. Both MW03 and MW01 are located immediately down gradient of the western fire fighting training area on the FRNSW. The training area is therefore likely to be acting as a source of contamination to groundwater, which corresponds with the results from surface water and soil/sediment samples.

PFAS in groundwater - off site

A sample of groundwater was collected from a private groundwater bore located to the north of the site (GW977466). PFAS was detected at concentrations greater than the LOR, and the concentration of PFHxS and PFOS (sum of total) exceeded the WA DER freshwater ecological criterion. The sample did not exceeded the nominated drinking water guideline, however it was noted to be close to the screening value, therefore further sampling would need to be conducted to confirm the sensitivity of the final result. The bore is registered for stock use.

7.3 EPA site 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[1]
- Trigger point 2: Soil leachate data reported above 1 µg/L

The maximum total PFAS concentration reported for soil leachate data was 15.9 µg/L collected from SB02, classifying the site as a 'Priority 2 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[2]
- Trigger point 2: Groundwater or surface water data reported between 0.1 µg/L to 10 µg/L

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[1] Trigger points values can be applied to PFOS alone or to the sum of PFAS as discussed by EnRisk (2016)

[2] Trigger points values can be applied to PFOS alone or to the sum of PFAS as discussed by EnRisk (2016)

- 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 29.1 µg/L in SW01 collected from the retention pond located adjacent to the fire training area. In addition, the concentration of total PFAS in surface water sample SW04, collected from the site boundary, was 14.4 µg/L. 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 0.03 and 2.63 µg/L with the off-site sample reporting a concentration of 0.24 µg/L. Under the EnRisk (2016) decision tree process, the site would be classified as priority 2 based on groundwater samples from on-site bores being reported between trigger points 2 and 3.

7.3.1 Overall prioritisation of the site

As outlined above, soil leachate and groundwater analytical data would classify the site as a priority 2 site for further investigation based on the data reported both on and off site. Surface water data indicated that the site should be classified as priority 1 owing the presence of total PFAS concentrations exceeding trigger point 1 in both the retention basin on site and in surface water channels at the site boundary.

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

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, fire 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 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, the following primary sources of contamination and associated COPC have been identified:

- Western firefighting training area on the FRNSW site, which includes storage locations for AFFF liquids, where extinguishers were filled, and the wash down areas after foam was used for fire training (gravel surface) – PFAS (including PFOS and PFOA) detected in groundwater, soil and sediment samples on the FRNSW site, and in drainage lines associated with this area
- The retention basin located on the FRNSW site adjacent to the western firefighting training area – PFAS (including PFOS and PFOA) detected in surface water, sediment and groundwater around this area
- The concrete skid pad on the southern area of the wider training facility (minor source) – low levels of PFAS detected in soils and concrete samples
- Retention basins in the wider training facility (minor source) – low levels of PFAS detected in surface water and sediments associated with these areas.

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 (except SS01), surface water and groundwater samples indicating that they are unlikely to be an ongoing source of contamination.

8.2 Receptors

When evaluating potential adverse health / environmental effects from exposure to a contaminated site, all potentially exposed populations should be considered. For this investigation, the key populations or receptors of interest are considered to include those identified in section 5.2.

8.3 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 shallow soil, sediments and dust.
- Incidental ingestion of contaminated soils and dust.
- Direct contact or ingestion of groundwater and/or surface water.
- 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.
- Surface runoff and sediment transport into storm water drainage and subsequent transport and discharge to surface waters.

Schedule B2 of the NEPM (2013) states that “As a preliminary screening measure, the potential for a vapour intrusion risk should be considered where the Henry’s law constant for a substance is greater than 1 x 10^{-5} atm/m^3/mol and its vapour pressure is > 1 mm Hg at room temperature”. US EPA (2014) list Henry’s law constants for PFOS and PFOA of 3.05 x10^{-9} atm/m^3/mol and ‘not measurable’ respectively, which based on the NEPM (2013) recommendation, suggests inhalation of vapours from these contaminants is unlikely to represent a human health risk at the site.

US EPA (2014) notes that once PFOS and PFOA are released to the atmosphere they are expected to absorb on to particles and settle to the ground through wet and dry deposition.

8.3.1 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 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 Dumaresq Creek approximately 1 km north of site, as well as through site drainage to the unnamed tributary which drains to Dumaresq Creek.

The Creek receives urban sources including residue from coal burning at the former Armidale gasworks, industrial sites such as the former timber pole impregnation plant, sewage treatment works, a landfill site, railway yards and farming practices, have led to contamination of Dumaresq Creek-Commissioners Waters through and downstream of Armidale (Ashley and Graham, 2001). Further, decant water from the sewage works at Armidale flow into the Dumaresq Creek.

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 drainage lines that all leaves this site at one outlet point at Mann Street. The main surface water receptors are considered to be the farm dams

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. Benthic organisms living in the sediment may be impacted through ingestion of the sediments.

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.

8.3.2 Source-pathway-receptor linkages

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

Table 8-1 Updated CSM

Potential source	Primary pathway	Receptor	Pathway present?
Soils in firefighting training areas (western area and skid pan) contaminated with PFAS	Dermal contact	FRNSW and wider training facility commercial workers	Unlikely – PFAS impact detected in shallow soil samples from this area (SB01-SB04) however impact below adopted assessment criteria
		Intrusive maintenance workers	Unlikely – PFAS impact detected in shallow soil samples from this area (SB01-SB04) however impact below adopted assessment criteria
	Vertical/horizontal migration of leachate through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes – PFAS impact in MW01 and MW03, down gradient of training facility
	Surface runoff and sediment transport	Surface waters (including drainage systems – secondary pathway)	Yes – PFAS detected in sediment samples from surface waters and drainage lines associated with this area.
		Off-site rural residential and commercial properties	Yes – sediment samples at the northern boundary and along drainage line contain PFAS
		Off-site ecological	Yes – off-site dams indicate PFAS impact above ecological screening criteria, which is likely to be associated with this area in the FRNSW site

Potential source	Primary pathway	Receptor	Pathway present?
Soils in firefighting training areas (water use only area)	Vertical/horizontal migration of leachate through unsaturated zone	Groundwater and surface waters	No – no contamination detected in soil samples from this area
	Dermal contact	FRNSW and wider training facility commercial workers and/or Intrusive maintenance workers	No – no contamination detected in soil samples from this area
	Surface runoff and sediment transport	Surface waters and subsequent off site receptors	No – no contamination detected in soil samples from this area
Surface water retention basin (FRNSW site) contaminated with PFAS	Dermal contact and ingestion	FRNSW and wider training facility commercial workers	Possible – PFAS impact present greater than drinking water and recreational criterion at SW01
	Vertical/horizontal migration of water through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes - PFAS impact in MW01 and MW03, down gradient of training facility
		Down gradient surface waters	Yes – Private dams down gradient report PFAS impact
	Surface water flows when overflowing	Down gradient surface waters, which may be used for stock watering	Yes – Private dams down gradient report PFAS impact greater than the ecological screening criteria
Surface water retention basin (wider training facility) contaminated with minor levels of PFAS	Dermal contact and ingestion	FRNSW and wider training facility commercial workers	Possible – PFAS below the recreational assessment criteria at SW02 and SW03, but greater than the drinking water criteria.
	Vertical/horizontal migration of water through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Possible – groundwater at MW04 contained low levels of PFAS, but below drinking water assessment criterion
		Down gradient surface waters	Unlikely – Private dams down gradient report PFAS impact, however these dams are unlikely to be the major contributing source (low levels of PFAS)

Potential source	Primary pathway	Receptor	Pathway present?
	Surface water flows when overflowing	Down gradient surface waters, which may be used for stock watering	Possible – Private dams down gradient report PFAS impact however these dams are unlikely to be the major contributing source (low levels of PFAS)
Surface water retention basins off-site on private properties (secondary sources) contaminated with PFAS	Surface water flows when overflowing	Down gradient surface water storage, which may be used for stock watering	Yes – PFAS detected in all off-site sample locations above drinking water (except SW08 which is not hydraulically connected to the drainage line) and ecological assessment criteria
		Down gradient ecological receptors	Possible – LOR for sample collected in Dumaresq Creek greater than adopted ecological assessment criteria. Creek not hydraulically connected to unnamed tributary/drainage lines but could be in times of high flow/rainfall.
Contaminated groundwater	Vertical/horizontal migration	Down gradient surface waters recharged by groundwater	Possible – Impact above adopted assessment criteria on site, however not detected in private bore off-site. Poor delineation of groundwater impact down gradient of the site therefore the extent of contamination in groundwater and hydraulic connection to surface waters has not been investigated.
		Abstraction bores (stock and/or domestic use)	Possible – PFAS concentration not detected in private bore off-site, however above adopted assessment criteria in groundwater on-site. Poor delineation of groundwater impact down gradient of the site therefore extent of contamination in groundwater and hydraulic connection to surface waters not investigated.

Potential source	Primary pathway	Receptor	Pathway present?
Soils impacted by fire accelerants and motor oils from vehicles (historic and current, TRH, BTEX and PAH)	Dermal contact and ingestion and/or Inhalation of vapours and/or Vertical/horizontal migration through unsaturated zone	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.

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 inferred groundwater flow was in a northerly direction.
- 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 based on direct contact under residential and commercial/industrial land use scenarios. No off-site soil bores report detects of PFAS. Risks associated with direct contact or accidental ingestion of PFAS impacted soils is therefore considered low however the presence of PFAS in soils represents an on-going source and risk to groundwater and surface water receptors.
- 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.
- The western training area on the FRNSW site (including the soils and associated retention basin) is likely to be the primary source of PFAS impact, which is migrating off-site to residential/commercial properties as well as to the local groundwater.
- PFAS was detected in the private groundwater abstraction bore, north of the site, in concentrations greater than the LOR but less than the adopted drinking water guidelines. The extent of the groundwater plume down gradient of the site is not fully delineated.
- 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. This should include investigation into how often the final surface water dam of the unnamed tributary/ drainage line (SW07) would over top and flow into Dumaresq Creek.
- 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.
  - Removal of water in the on-site dams and the three neighbouring residential properties and consideration of options to either remove impacted sediments or re-line the dams to prevent further contact with PFAS impacted sediments.
  - Drainage channels between the dams could be cleared out to remove soils and sediments which are likely to act as potential leaching sources.
  - 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 off site investigation to assess whether impacted groundwater is migrating towards other potential abstraction points down gradient of the site.

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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.

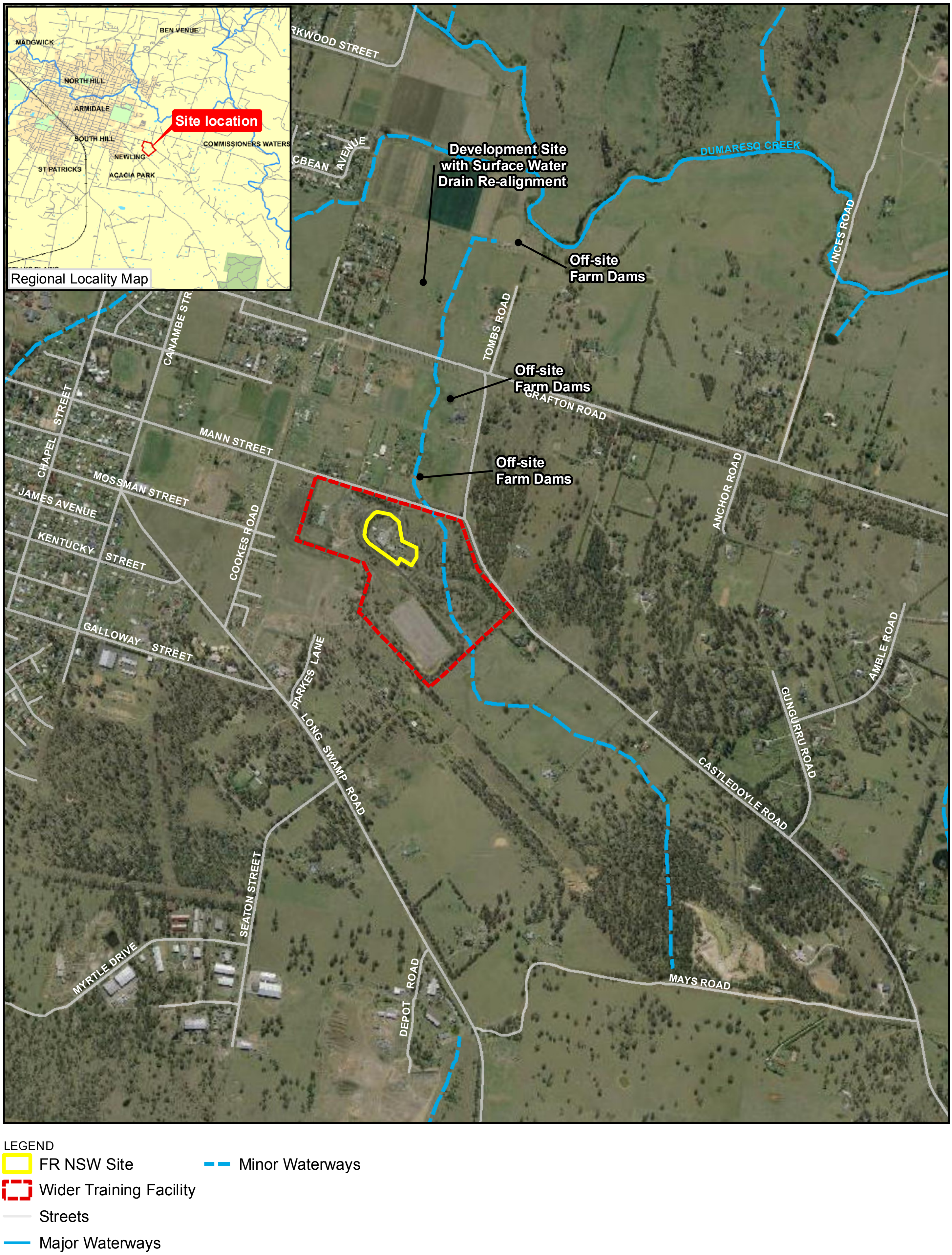
The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

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



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Metres

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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Fire & Rescue NSW
Armidale Site Investigation

Job Number	21-25583
Revision	A
Date	15 Feb 2017

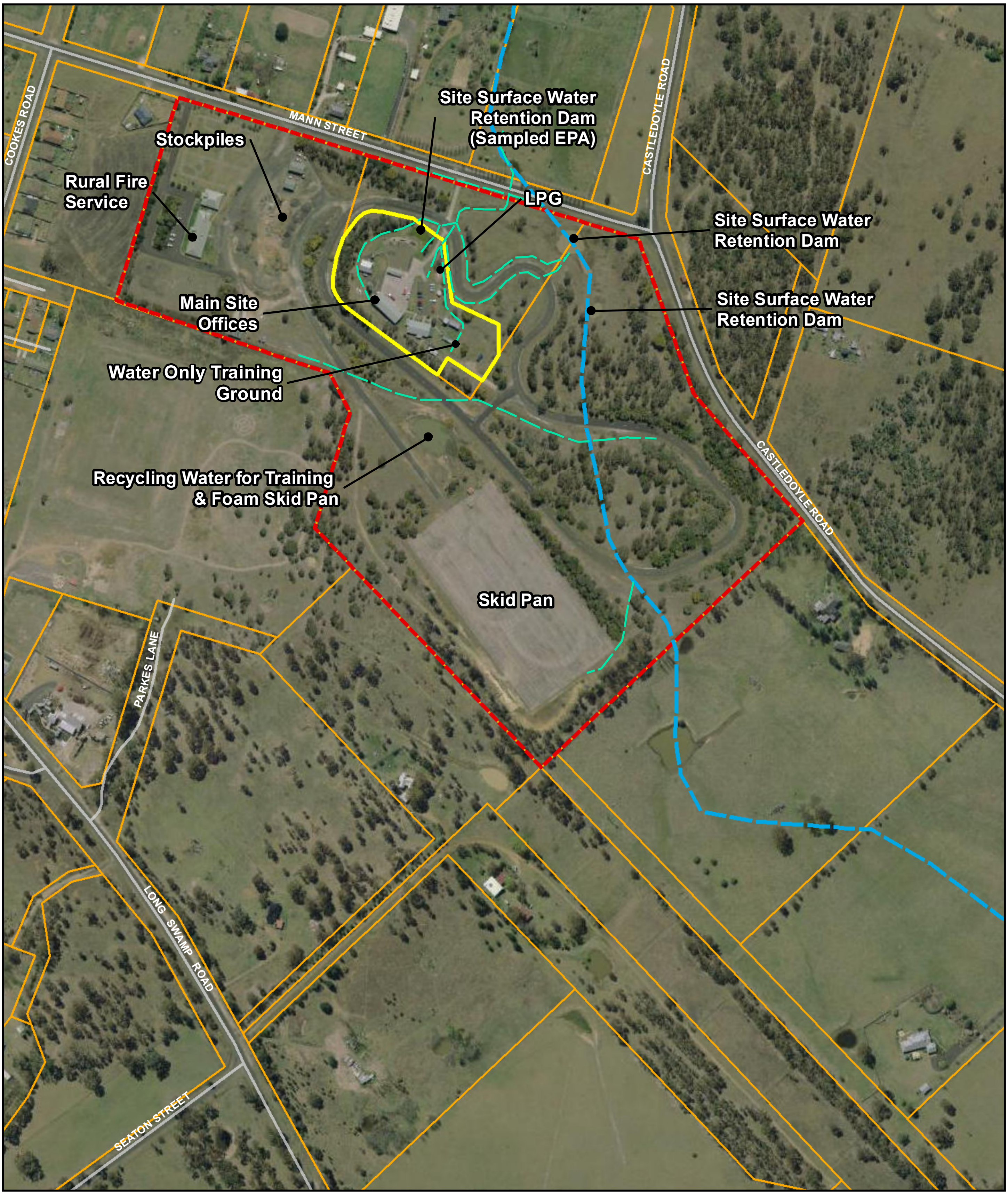
Site Location and Key Off-site Receptors

Figure 1

G:\21\25583\GIS\Maps\Deliverables\Armidale\21_25583_Z001_Armidale_SiteLocation.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data source: Imagery - ©Land and Property Information (Extracted: 15/02/17); Streets, Waterways - NSW LPI 2015 DTDB. Created by:mweber



LEGEND

🟨 FR NSW Site
🟥 Wider Training Facility
🟧 Cadastre
— Streets
— Major Waterways
- - Minor Waterways
- - Inferred Surface Drainage

Paper Size A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Fire & Rescue NSW
Armidale Site Investigation

Job Number	21-25583
Revision	A
Date	15 Feb 2017

Site Layout

Figure 2

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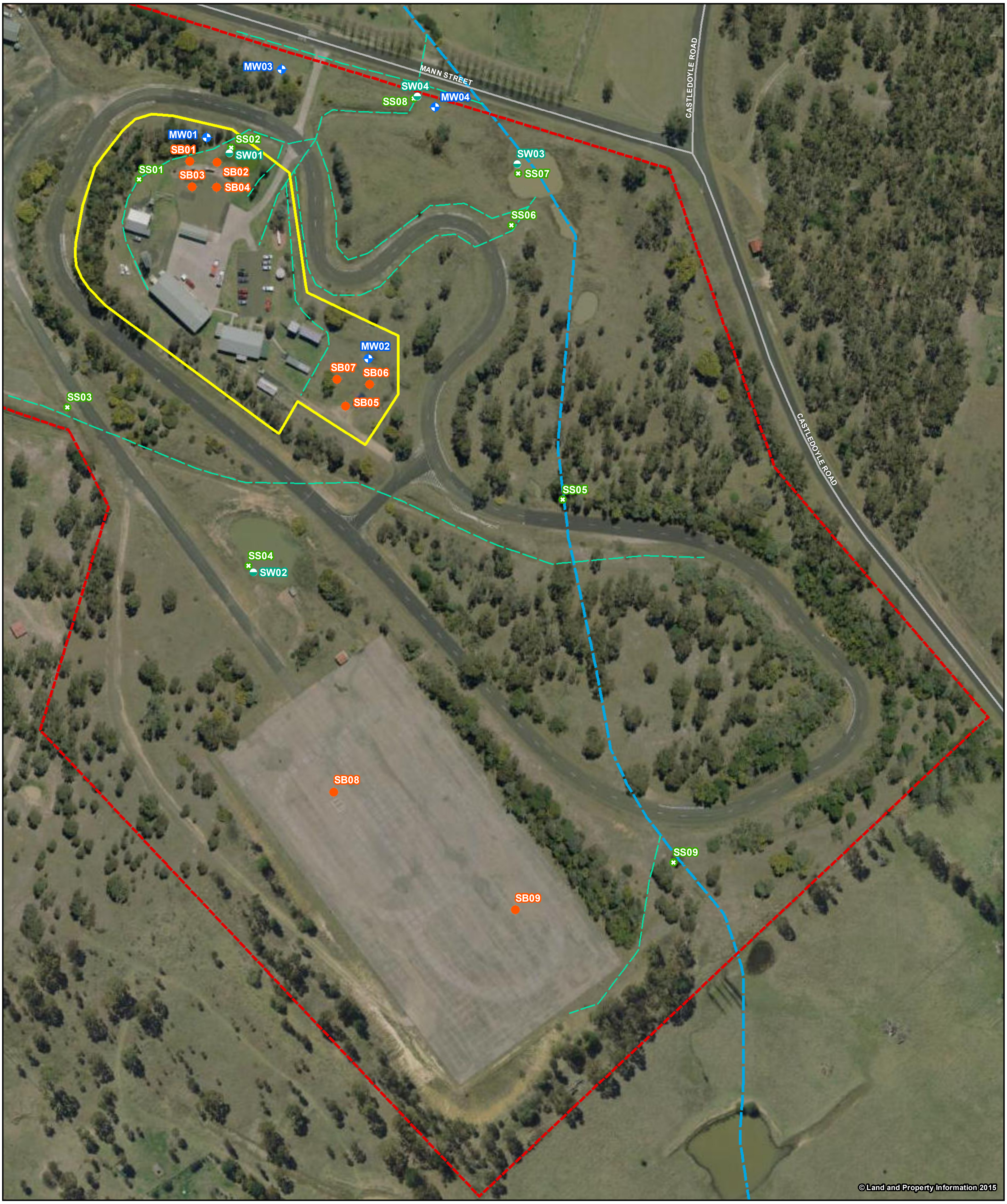
Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data source: Imagery - ©Land and Property Information (Extracted: 15/02/17); Streets, Waterways - NSW LPI 2015 DTDB. Created by:mweber



LEGEND

- 🟨 FR NSW Site
- 🟥 Wider Training Facility
- — Streets
- — Inferred Surface Drainage
- — Major Waterways
- — Minor Waterways
- ◆ Groundwater Monitoring Well (GHD, 2016)
- ◆ Existing Private Groundwater Well
- ● Soil Borehole (GHD, 2016)
- ● Sediment Sample Location (GHD, 2016)
- ● Surface Water Sample Location (GHD, 2016)

0 10 20 30 40 50
Metres

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

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Armidale Site Investigation

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Revision	A
Date	15 Feb 2017

Investigation Locations (Within the Wider Training Facility)

Figure 3A

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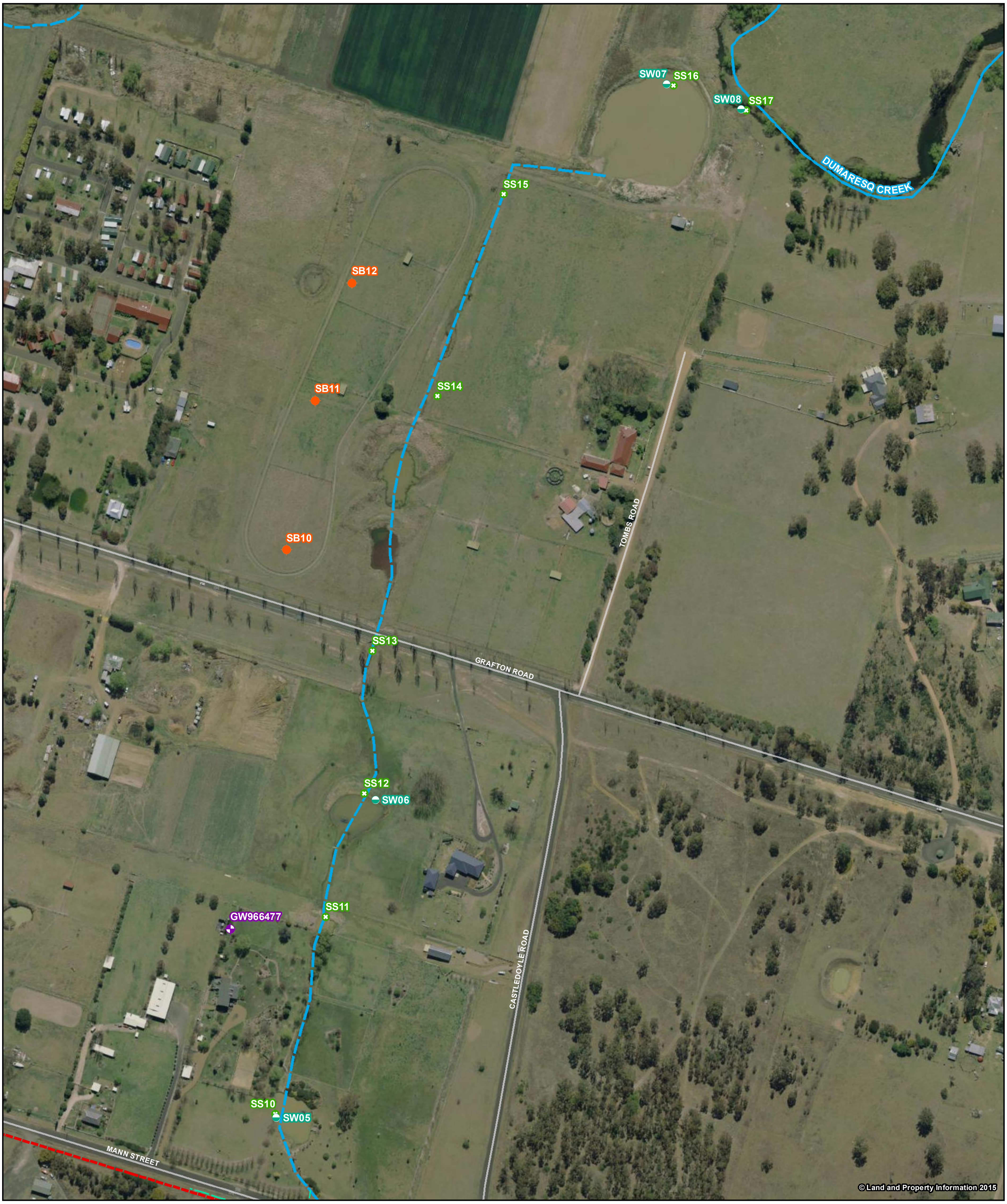
Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



LEGEND

- FR NSW Site
- Wider Training Facility
- Streets
- Major Waterways
- Minor Waterways
- Inferred Surface Drainage
- Groundwater Monitoring Well (GHD, 2016)
- Existing Private Groundwater Well
- Soil Borehole (GHD, 2016)
- Sediment Sample Location (GHD, 2016)
- Surface Water Sample Location (GHD, 2016)

0 20 40 60 80 100
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Fire & Rescue NSW
Armidale Site Investigation

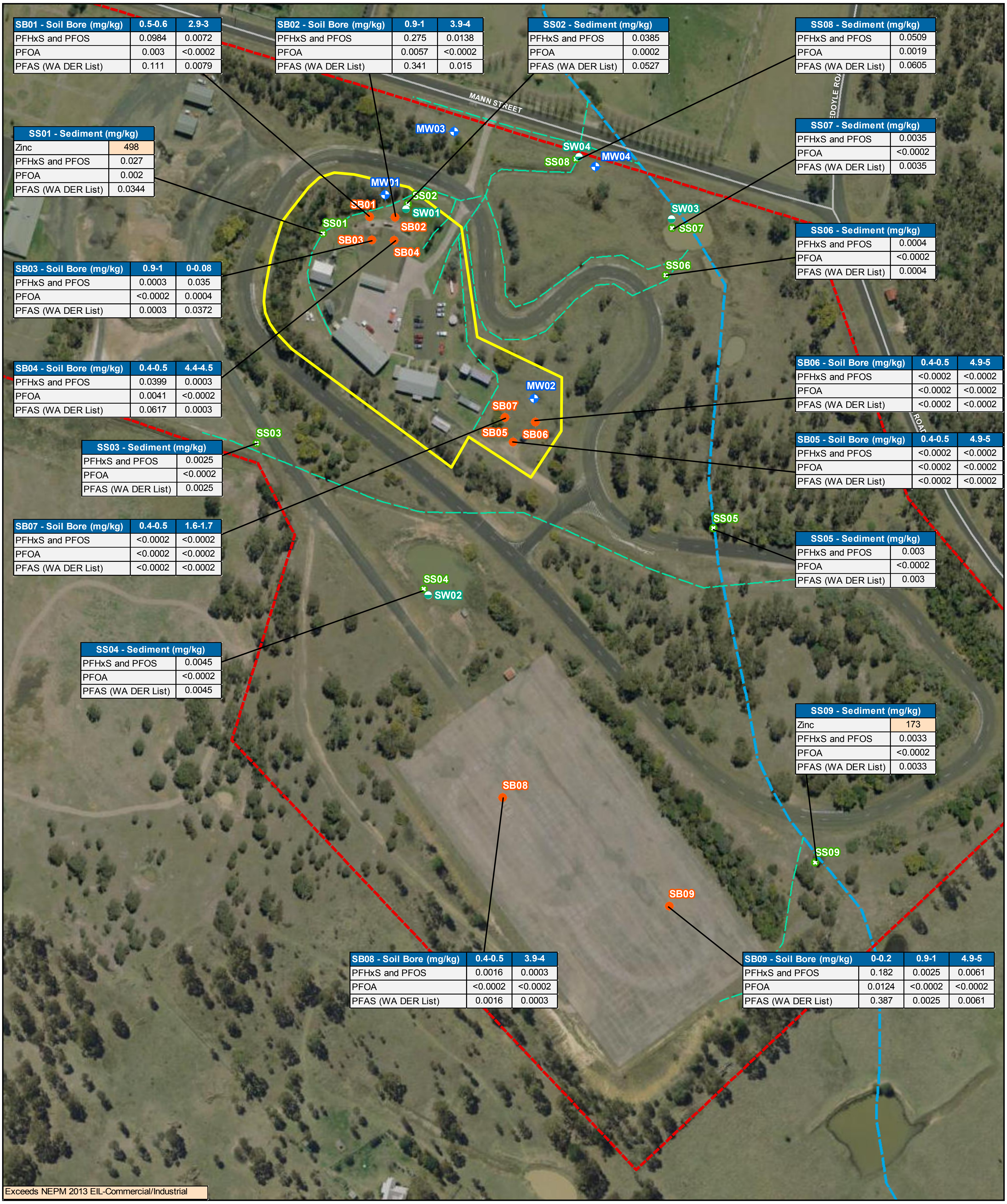
Job Number	21-25583
Revision	A
Date	16 Feb 2017

Investigation Locations (Outside the Wider Training Facility)

Figure 3B

\\ghdnet\ghd\AU\Sydney\Projects\21\25583\GIS\Maps\Deliverables\Armidale\21_25583_Z005B_Armidale_InvestigationLocations_OffSite.mxd

Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



SB01 - Soil Bore (mg/kg)	0.5-0.6	2.9-3
PFHxS and PFOS	0.0984	0.0072
PFOA	0.003	<0.0002
PFAS (WA DER List)	0.111	0.0079

SB02 - Soil Bore (mg/kg)	0.9-1	3.9-4
PFHxS and PFOS	0.275	0.0138
PFOA	0.0057	<0.0002
PFAS (WA DER List)	0.341	0.015

SS02 - Sediment (mg/kg)	
PFHxS and PFOS	0.0385
PFOA	0.0002
PFAS (WA DER List)	0.0527

SS08 - Sediment (mg/kg)	
PFHxS and PFOS	0.0509
PFOA	0.0019
PFAS (WA DER List)	0.0605

SS01 - Sediment (mg/kg)	
Zinc	498
PFHxS and PFOS	0.027
PFOA	0.002
PFAS (WA DER List)	0.0344

SS07 - Sediment (mg/kg)	
PFHxS and PFOS	0.0035
PFOA	<0.0002
PFAS (WA DER List)	0.0035

SS06 - Sediment (mg/kg)	
PFHxS and PFOS	0.0004
PFOA	<0.0002
PFAS (WA DER List)	0.0004

SB03 - Soil Bore (mg/kg)	0.9-1	0-0.08
PFHxS and PFOS	0.0003	0.035
PFOA	<0.0002	0.0004
PFAS (WA DER List)	0.0003	0.0372

SB04 - Soil Bore (mg/kg)	0.4-0.5	4.4-4.5
PFHxS and PFOS	0.0399	0.0003
PFOA	0.0041	<0.0002
PFAS (WA DER List)	0.0617	0.0003

SB06 - Soil Bore (mg/kg)	0.4-0.5	4.9-5
PFHxS and PFOS	<0.0002	<0.0002
PFOA	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002

SS03 - Sediment (mg/kg)	
PFHxS and PFOS	0.0025
PFOA	<0.0002
PFAS (WA DER List)	0.0025

SB05 - Soil Bore (mg/kg)	0.4-0.5	4.9-5
PFHxS and PFOS	<0.0002	<0.0002
PFOA	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002

SB07 - Soil Bore (mg/kg)	0.4-0.5	1.6-1.7
PFHxS and PFOS	<0.0002	<0.0002
PFOA	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002

SS05 - Sediment (mg/kg)	
PFHxS and PFOS	0.003
PFOA	<0.0002
PFAS (WA DER List)	0.003

SS04 - Sediment (mg/kg)	
PFHxS and PFOS	0.0045
PFOA	<0.0002
PFAS (WA DER List)	0.0045

SS09 - Sediment (mg/kg)	
Zinc	173
PFHxS and PFOS	0.0033
PFOA	<0.0002
PFAS (WA DER List)	0.0033

SB08 - Soil Bore (mg/kg)	0.4-0.5	3.9-4
PFHxS and PFOS	0.0016	0.0003
PFOA	<0.0002	<0.0002
PFAS (WA DER List)	0.0016	0.0003

SB09 - Soil Bore (mg/kg)	0-0.2	0.9-1	4.9-5
PFHxS and PFOS	0.182	0.0025	0.0061
PFOA	0.0124	<0.0002	<0.0002
PFAS (WA DER List)	0.387	0.0025	0.0061

Exceeds NEPM 2013 EIL-Commercial/Industrial

Note: Adopted assessment criteria with no exceedances are not shown on this figure

LEGEND

▭	FR NSW Site	– –	Inferred Surface Drainage	◒	Surface Water Sample Location (GHD, 2016)
⬚	Wider Training Facility	⊕	Groundwater Monitoring Well (GHD, 2016)		
—	Streets	⊕	Existing Private Groundwater Well		
—	Major Waterways	●	Soil Borehole (GHD, 2016)		
– –	Minor Waterways	⊗	Sediment Sample Location (GHD, 2016)		

0 10 20 30 40 50
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Fire & Rescue NSW
Armidale Site Investigation

Job Number 21-25583
Revision A
Date 16 Feb 2017

Soil Exceedances - Onsite

Figure 4A

G:\21\25583\GIS\Maps\Deliverables\Armidale\21_25583_Z006A_Armidale_Soil_Exceedances_Onsite.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber

SS16 - Sediment (mg/kg)	
PFHxS and PFOS	0.0034
PFOA	<0.0002
PFAS (WA DER List)	0.0034

SS15 - Sediment (mg/kg)	
PFHxS and PFOS	0.0014
PFOA	<0.0002
PFAS (WA DER List)	0.0014

SS17 - Sediment (mg/kg)	
PFHxS and PFOS	0.0026
PFOA	<0.0002
PFAS (WA DER List)	0.0026

SB12 - Soil Bore (mg/kg)	0-0.1	0.8-0.9
PFHxS and PFOS	0.0005	<0.0002
PFOA	<0.0002	<0.0002
PFAS (WA DER List)	0.0005	<0.0002

SS14 - Sediment (mg/kg)	
PFHxS and PFOS	0.0118
PFOA	<0.0002
PFAS (WA DER List)	0.0118

SB11 - Soil Bore (mg/kg)	0.2-0.3	0.5-0.6	1.2-1.3
PFHxS and PFOS	<0.0002	<0.0002	<0.0002
PFOA	<0.0002	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002	<0.0002

SS13 - Sediment (mg/kg)	
PFHxS and PFOS	0.0117
PFOA	<0.0002
PFAS (WA DER List)	0.012

SB10 - Soil Bore (mg/kg)	0.3-0.4	0.6-0.7	1.2-1.3
PFHxS and PFOS	<0.0002	<0.0002	<0.0002
PFOA	<0.0002	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002	<0.0002

SS12 - Sediment (mg/kg)	
PFHxS and PFOS	0.005
PFOA	<0.0002
PFAS (WA DER List)	0.005

SS11 - Sediment (mg/kg)	
PFHxS and PFOS	0.021
PFOA	0.0003
PFAS (WA DER List)	0.0224

SS10 - Sediment (mg/kg)	
PFHxS and PFOS	0.0049
PFOA	0.0002
PFAS (WA DER List)	0.0051

Note: Adopted assessment criteria with no exceedances are not shown on this figure

LEGEND

🟨	FR NSW Site	– –	Minor Waterways	◒	Surface Water Sample Location (GHD, 2016)
🟥	Wider Training Facility	⊕	Groundwater Monitoring Well (GHD, 2016)		
—	Streets	⊕	Existing Private Groundwater Well		
—	Major Waterways	●	Soil Borehole (GHD, 2016)		
– –	Inferred Surface Drainage	⊗	Sediment Sample Location (GHD, 2016)		

0 10 20 30 40 50
Metres

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

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Fire & Rescue NSW
Armidale Site Investigation

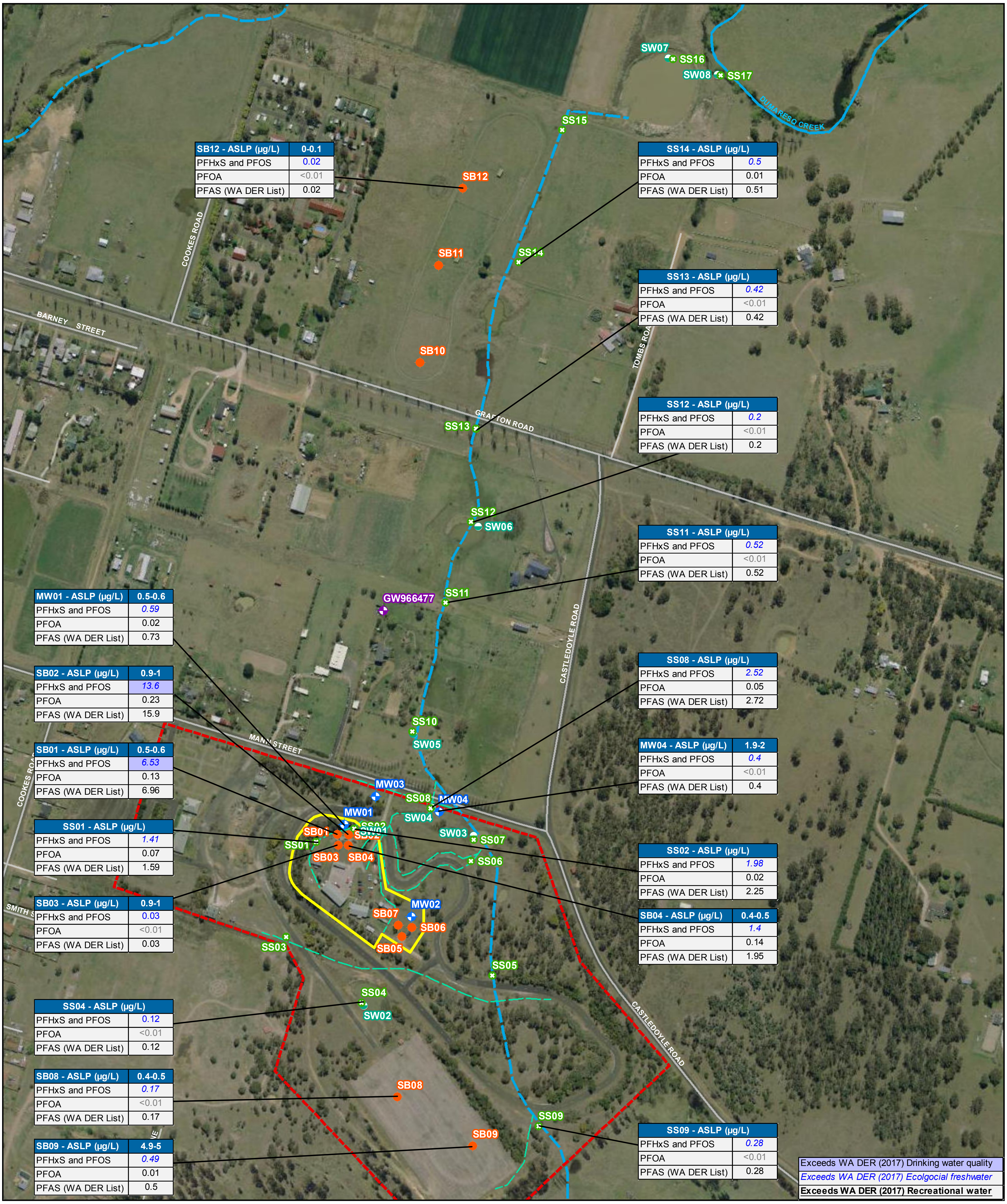
Job Number	21-25583
Revision	A
Date	15 Feb 2017

Soil Exceedances - Offsite

Figure 4B

G:\21\25583\GIS\Maps\Deliverables\Armidale\21_25583_Z006B_Armidale_Soil_Exceedances_Offsite.mxd

Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



SB12 - ASLP (µg/L)	0-0.1
PFHxS and PFOS	*0.02*
PFOA	<0.01
PFAS (WA DER List)	0.02

SS14 - ASLP (µg/L)	
PFHxS and PFOS	*0.5*
PFOA	0.01
PFAS (WA DER List)	0.51

SS13 - ASLP (µg/L)	
PFHxS and PFOS	*0.42*
PFOA	<0.01
PFAS (WA DER List)	0.42

SS12 - ASLP (µg/L)	
PFHxS and PFOS	*0.2*
PFOA	<0.01
PFAS (WA DER List)	0.2

SS11 - ASLP (µg/L)	
PFHxS and PFOS	*0.52*
PFOA	<0.01
PFAS (WA DER List)	0.52

MW01 - ASLP (µg/L)	0.5-0.6
PFHxS and PFOS	*0.59*
PFOA	0.02
PFAS (WA DER List)	0.73

SS08 - ASLP (µg/L)	
PFHxS and PFOS	*2.52*
PFOA	0.05
PFAS (WA DER List)	2.72

SB02 - ASLP (µg/L)	0.9-1
PFHxS and PFOS	*13.6*
PFOA	0.23
PFAS (WA DER List)	15.9

MW04 - ASLP (µg/L)	1.9-2
PFHxS and PFOS	*0.4*
PFOA	<0.01
PFAS (WA DER List)	0.4

SB01 - ASLP (µg/L)	0.5-0.6
PFHxS and PFOS	*6.53*
PFOA	0.13
PFAS (WA DER List)	6.96

SS01 - ASLP (µg/L)	
PFHxS and PFOS	*1.41*
PFOA	0.07
PFAS (WA DER List)	1.59

SS02 - ASLP (µg/L)	
PFHxS and PFOS	*1.98*
PFOA	0.02
PFAS (WA DER List)	2.25

SB03 - ASLP (µg/L)	0.9-1
PFHxS and PFOS	*0.03*
PFOA	<0.01
PFAS (WA DER List)	0.03

SB04 - ASLP (µg/L)	0.4-0.5
PFHxS and PFOS	*1.4*
PFOA	0.14
PFAS (WA DER List)	1.95

SS04 - ASLP (µg/L)	
PFHxS and PFOS	*0.12*
PFOA	<0.01
PFAS (WA DER List)	0.12

SB08 - ASLP (µg/L)	0.4-0.5
PFHxS and PFOS	*0.17*
PFOA	<0.01
PFAS (WA DER List)	0.17

SS09 - ASLP (µg/L)	
PFHxS and PFOS	*0.28*
PFOA	<0.01
PFAS (WA DER List)	0.28

SB09 - ASLP (µg/L)	4.9-5
PFHxS and PFOS	*0.49*
PFOA	0.01
PFAS (WA DER List)	0.5

Exceeds WA DER (2017) Drinking water quality

Exceeds WA DER (2017) Ecolgocial freshwater

Exceeds WA DER (2017) Recreational water

LEGEND

🟨	FR NSW Site	— —	Inferred Surface Drainage	◒	Surface Water Sample Location (GHD, 2016)
🟥	Wider Training Facility	⊕	Groundwater Monitoring Well (GHD, 2016)		
—	Streets	⊕	Existing Private Groundwater Well		
—	Major Waterways	●	Soil Borehole (GHD, 2016)		
— —	Minor Waterways	⊗	Sediment Sample Location (GHD, 2016)		

0 25 50 75 100 125
Metres

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

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Fire & Rescue NSW
Armidale Site Investigation

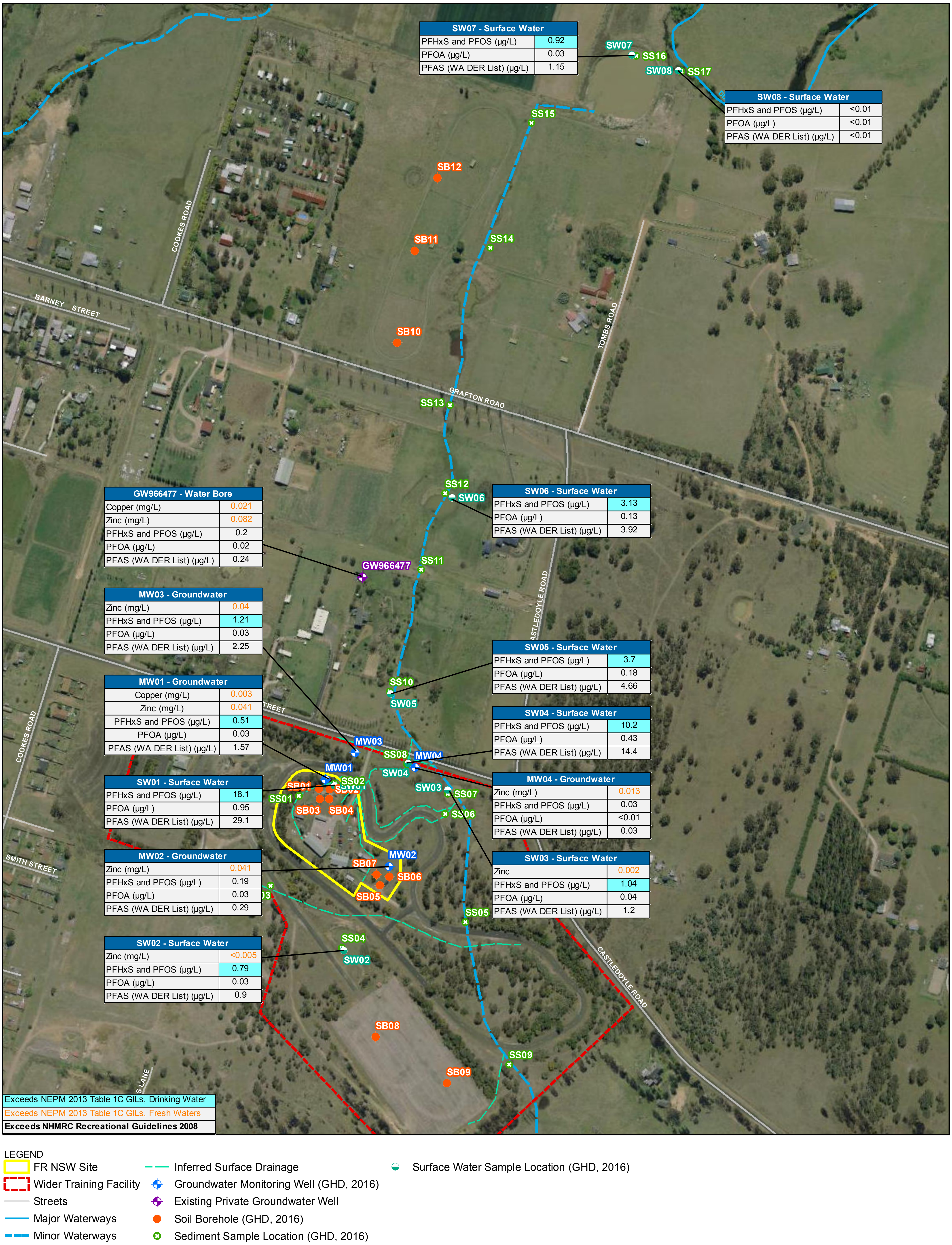
Job Number	21-25583
Revision	A
Date	16 Feb 2017

ASLP Exceedances

Figure 5

G:\21\25583\GIS\Maps\Deliverables\Armidale\21_25583_Z007_Armidale_ASLP_Exceedances.mxd

Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



SW07 - Surface Water	
PFHxS and PFOS (µg/L)	0.92
PFOA (µg/L)	0.03
PFAS (WA DER List) (µg/L)	1.15

SW08 - Surface Water	
PFHxS and PFOS (µg/L)	<0.01
PFOA (µg/L)	<0.01
PFAS (WA DER List) (µg/L)	<0.01

SW06 - Surface Water	
PFHxS and PFOS (µg/L)	3.13
PFOA (µg/L)	0.13
PFAS (WA DER List) (µg/L)	3.92

GW966477 - Water Bore	
Copper (mg/L)	0.021
Zinc (mg/L)	0.082
PFHxS and PFOS (µg/L)	0.2
PFOA (µg/L)	0.02
PFAS (WA DER List) (µg/L)	0.24

MW03 - Groundwater	
Zinc (mg/L)	0.04
PFHxS and PFOS (µg/L)	1.21
PFOA (µg/L)	0.03
PFAS (WA DER List) (µg/L)	2.25

MW01 - Groundwater	
Copper (mg/L)	0.003
Zinc (mg/L)	0.041
PFHxS and PFOS (µg/L)	0.51
PFOA (µg/L)	0.03
PFAS (WA DER List) (µg/L)	1.57

SW05 - Surface Water	
PFHxS and PFOS (µg/L)	3.7
PFOA (µg/L)	0.18
PFAS (WA DER List) (µg/L)	4.66

SW04 - Surface Water	
PFHxS and PFOS (µg/L)	10.2
PFOA (µg/L)	0.43
PFAS (WA DER List) (µg/L)	14.4

SW01 - Surface Water	
PFHxS and PFOS (µg/L)	18.1
PFOA (µg/L)	0.95
PFAS (WA DER List) (µg/L)	29.1

MW04 - Groundwater	
Zinc (mg/L)	0.013
PFHxS and PFOS (µg/L)	0.03
PFOA (µg/L)	<0.01
PFAS (WA DER List) (µg/L)	0.03

MW02 - Groundwater	
Zinc (mg/L)	0.041
PFHxS and PFOS (µg/L)	0.19
PFOA (µg/L)	0.03
PFAS (WA DER List) (µg/L)	0.29

SW03 - Surface Water	
Zinc	0.002
PFHxS and PFOS (µg/L)	1.04
PFOA (µg/L)	0.04
PFAS (WA DER List) (µg/L)	1.2

SW02 - Surface Water	
Zinc (mg/L)	<0.005
PFHxS and PFOS (µg/L)	0.79
PFOA (µg/L)	0.03
PFAS (WA DER List) (µg/L)	0.9

Exceeds NEPM 2013 Table 1C GILs, Drinking Water

Exceeds NEPM 2013 Table 1C GILs, Fresh Waters

Exceeds NHMRC Recreational Guidelines 2008

0 25 50 75 100 125
Metres

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

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Fire & Rescue NSW
Armidale Site Investigation

Job Number	21-25583
Revision	A
Date	16 Feb 2017

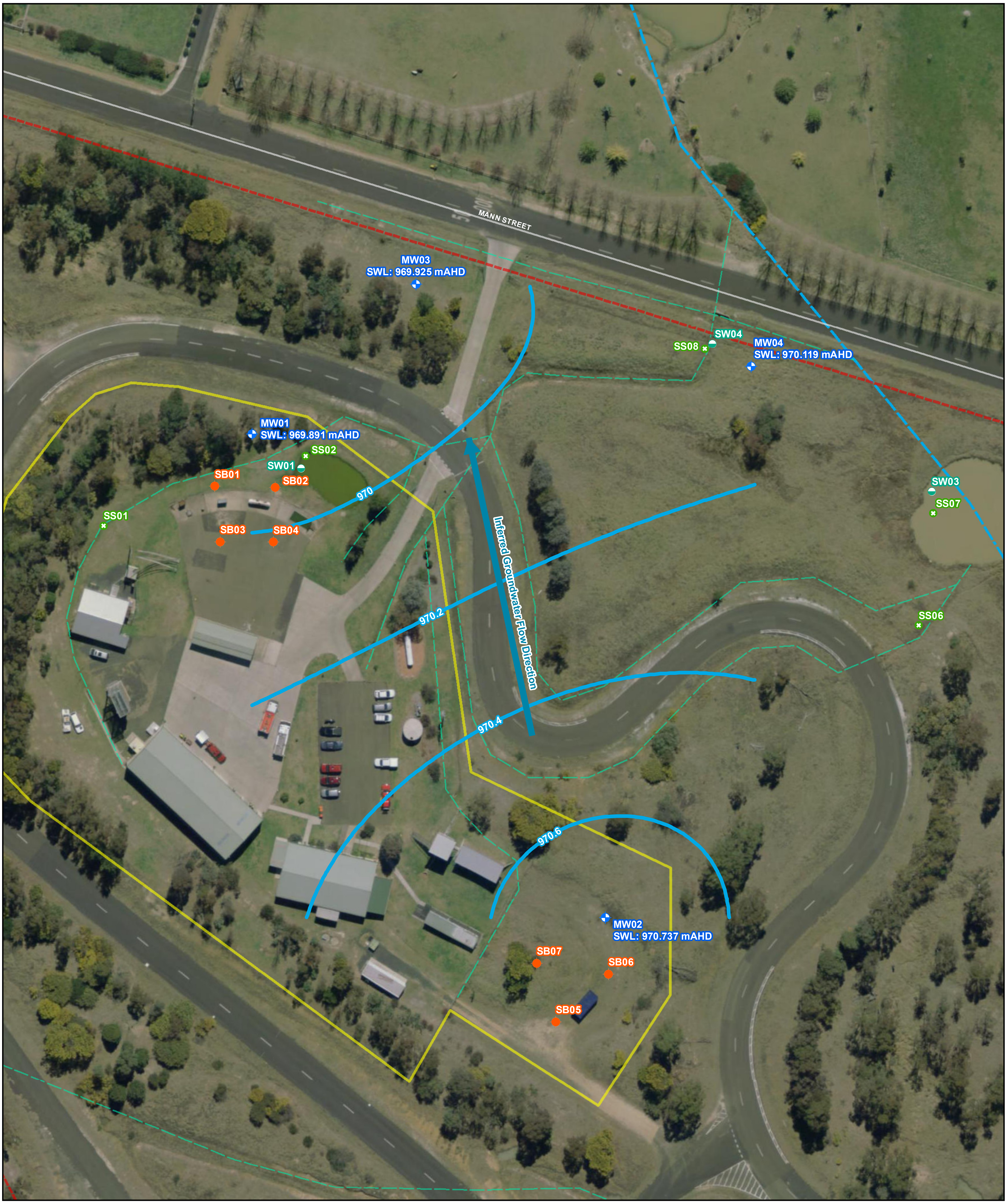
Groundwater and Surface Water Exceedances

Figure 6

G:\21\25583\GIS\Maps\Deliverables\Armidale\21_25583_Z008_Armidale_Water_Exceedances.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



LEGEND

- ▭ FR NSW Site
- ▭ Wider Training Facility
- — Streets
- – – Inferred Surface Drainage
- — Major Waterways
- – – Minor Waterways
- — Groundwater Elevation Contours (mAHD)
- ⊕ Groundwater Monitoring Well (GHD, 2016)
- ⊕ Existing Private Groundwater Well
- ● Soil Borehole (GHD, 2016)
- ⊗ Sediment Sample Location (GHD, 2016)
- ◒ Surface Water Sample Location (GHD, 2016)

0 4.5 9 13.5 18 22.5

Metres

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

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Fire & Rescue NSW
Armidale Site Investigation

Job Number	21-25583
Revision	A
Date	17 Feb 2017

Groundwater Elevation Contours

Figure 7

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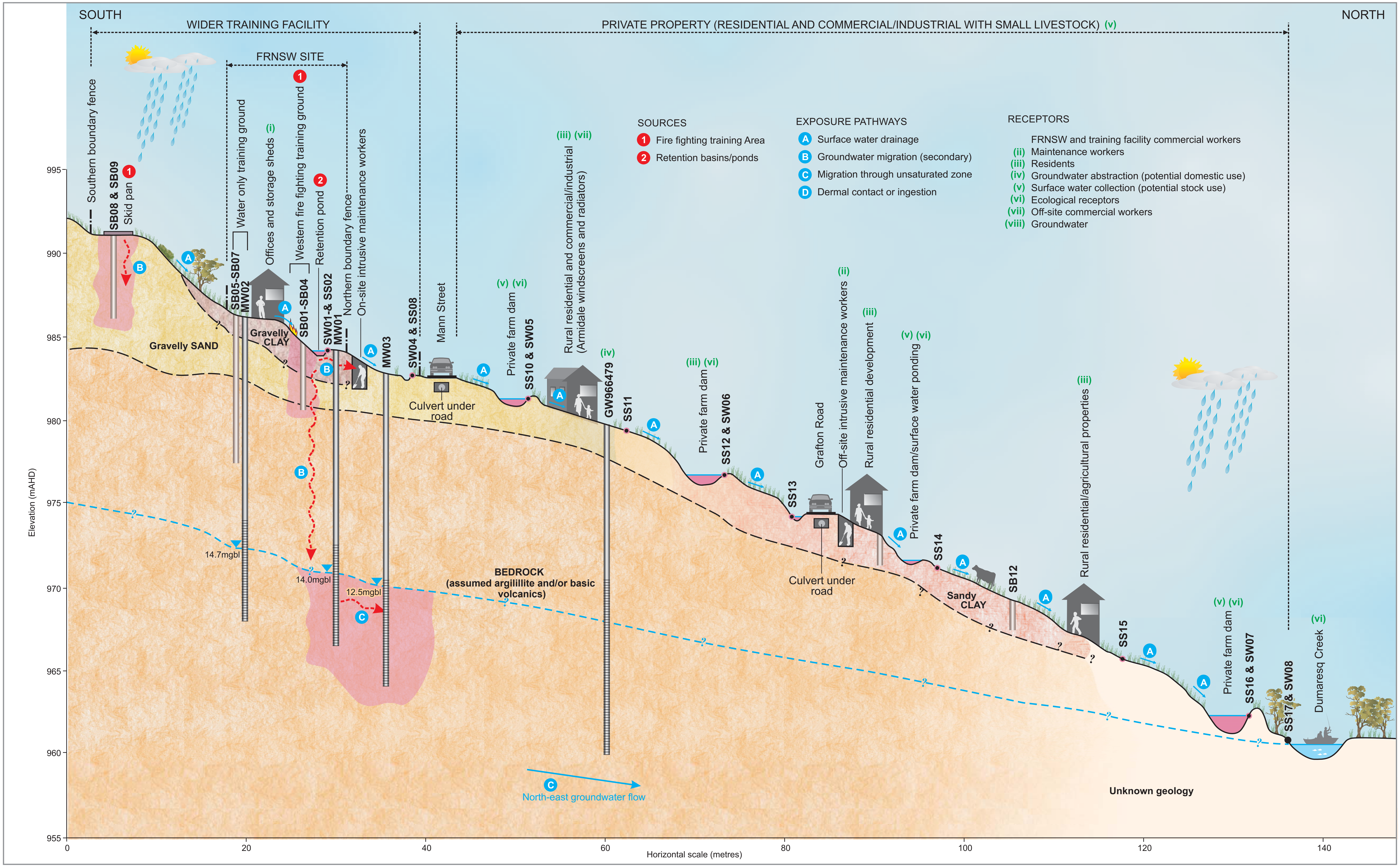
Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



Conceptual diagram only - not to scale

LEGEND

▨ Gravelly SAND
▨ Gravelly CLAY
▨ Sandy CLAY
▨ Unknown geology
▨ PFAS impact
Soil bore
Piezometer (groundwater well)
Screen
Groundwater table
● Surface sample
Surface water flows
Migration

Fire & Rescue NSW
Armidale Training Centre

Revised Conceptual Site Model

Job Number	21-25583
Revision	A
Date	31 Mar 2017

Figure 8

GHD\Launceston\Projects\21\25583\2125583_LTN_07.cdr

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Appendix B – Analytical results summary tables

Appendix B
Table A1
Soil and sediment analytical results - on-site: Human health

				TOC	Inorganics			Metals										
				Total Organic Carbon	pH (Final)	Moisture	Moisture Content (dried @ 103°C)	Aluminium	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Silicon	Zinc
				%	pH Units	%	%	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	0.1	1	1	50	5	1	2	5	50	5	0.1	2	1	5
DER (2017) Interim PFAS Guidelines - Health commercial/industrial																		
CRCCare Soil Direct Contact HSL-D Commercial / Industrial																		
NEPM 2013 Table 1A(1) HIL D Comm/Ind									*3000*[#1]	*900*	*3600*[#2]	*240000*		*1500*[#3]	*730*[#4]	*6000*		*400000*
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																		
0-1m																		
1-2m																		
2-4m																		
>4m																		
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time															
SB01_0.5-0.6	SB01	0.5-0.6	30/11/2016	-	7.9	12	-	-	-	-	-	-	-	-	-	-	-	-
QA02	SB01	0.5-0.6	30/11/2016	-	-	13.6	-	-	-	-	-	-	-	-	-	-	-	-
SB01_2.9-3.0	SB01	2.9-3	30/11/2016	-	-	8.6	-	-	-	-	-	-	-	-	-	-	-	-
SB02_0.9-1.0	SB02	0.9-1	30/11/2016	<0.5	7.8	21	-	12,600	<5	<1	14	8	18,100	10	<0.1	7	18,600	10
SB02_3.9-4.0	SB02	3.9-4	30/11/2016	-	-	8.9	-	-	-	-	-	-	-	-	-	-	-	-
SB03_0.9-1.0	SB03	0.9-1	30/11/2016	<0.5	8.1	17.1	-	11,900	6	<1	32	11	46,900	20	<0.1	12	13,000	8
QA03	SB03	0.9-1	30/11/2016	-	-	-	15	-	5.8	<0.4	30	9.2	-	20	<0.1	7.5	-	9.5
SB03_Asphalt_0-0.08	SB03	0-0.08	30/11/2016	-	-	2.1	-	-	-	-	-	-	-	-	-	-	-	-
SB04_0.4-0.5	SB04	0.4-0.5	30/11/2016	-	8.1	15.6	-	-	-	-	-	-	-	-	-	-	-	-
SB04_4.4-4.5	SB04	4.4-4.5	30/11/2016	-	-	6.5	-	-	-	-	-	-	-	-	-	-	-	-
SB05_0.4-0.5	SB05	0.4-0.5	1/12/2016	-	-	12.6	-	-	<5	<1	28	16	-	16	<0.1	14	-	29
SB05_4.9-5.0	SB05	4.9-5	1/12/2016	-	-	6.3	-	-	-	-	-	-	-	-	-	-	-	-
SB06_0.4-0.5	SB06	0.4-0.5	1/12/2016	<0.5	-	20.2	-	12,400	<5	<1	34	8	43,500	14	<0.1	8	16,600	23
QA04	SB06	0.4-0.5	1/12/2016	-	-	-	17	-	2.8	<0.4	17	8.8	-	11	<0.1	12	-	31
SB06_4.9-5.0	SB06	4.9-5	1/12/2016	-	-	11.8	-	-	-	-	-	-	-	-	-	-	-	-
SB07_0.4-0.5	SB07	0.4-0.5	1/12/2016	-	-	13	-	-	9	<1	46	11	-	19	<0.1	13	-	19
SB07_1.6-1.7	SB07	1.6-1.7	1/12/2016	-	-	4.6	-	-	-	-	-	-	-	-	-	-	-	-
SB08_0.4-0.5	SB08	0.4-0.5	1/12/2016	-	9.2	20.4	-	-	-	-	-	-	-	-	-	-	-	-
SB08_3.9-4.0	SB08	3.9-4	1/12/2016	-	-	8.9	-	-	-	-	-	-	-	-	-	-	-	-
SB09_0.9-1.0	SB09	0.9-1	1/12/2016	<0.5	-	23.1	-	10,300	<5	<1	12	9	34,100	11	<0.1	23	16,900	58
QA06	SB09	0.9-1	1/12/2016	-	-	25.2	-	-	5	<1	11	9	-	10	<0.1	27	-	62
SB09_4.9-5.0	SB09	4.9-5	1/12/2016	-	10.3	10	-	-	-	-	-	-	-	-	-	-	-	-
SB09_Concrete_0-0.2	SB09	0-0.2	1/12/2016	-	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-
SS01	SS01		28/11/2016	5.2	7.8	11.3	-	10,200	7	<1	25	18	24,100	17	<0.1	13	510	498
SS02	SS02		28/11/2016	-	6.9	24.1	-	-	-	-	-	-	-	-	-	-	-	-
SS03	SS03		28/11/2016	-	-	13.4	-	-	-	-	-	-	-	-	-	-	-	-
SS04	SS04		28/11/2016	0.7	6.9	26.4	-	5000	<5	<1	22	<5	16,600	10	<0.1	3	97	20
SS05	SS05		28/11/2016	0.6	-	26.4	-	7240	<5	<1	31	8	26,600	10	<0.1	6	283	22
SS06	SS06		28/11/2016	-	-	10.4	-	-	<5	<1	18	9	-	24	<0.1	8	-	33
SS07	SS07		1/12/2016	<0.5	-	23.9	-	3780	5	<1	51	9	27,900	10	<0.1	5	114	23
SS08	SS08		1/12/2016	-	7.4	10.8	-	-	<5	<1	30	10	-	18	<0.1	8	-	18
QA01	SS09		28/11/2016	-	-	38.7	-	-	<5	<1	20	16	-	20	<0.1	13	-	173
SS09	SS09		28/11/2016	1.9	7	37.1	-	19,500	<5	<1	19	15	33,500	18	<0.1	12	3780	168

	TRH - NEPM 2013							TRH - NEPM 1999						BTEX & MAH					
	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 - C 9 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
	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	10	10	50	50	100	100	50	10	50	100	100	50	0.2	0.5	0.5	0.5	0.5	0.5
DER (2017) Interim PFAS Guidelines - Health commercial/industrial																		
CRCCare Soil Direct Contact HSL-D Commercial / Industrial		26000		20000	27000	38000							430	99000	27000			81000
NEPM 2013 Table 1A(1) HIL D Comm/Ind																		
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																		
0-1m	260[#6]		NL										3	NL	NL			230
1-2m	370[#6]		NL										3	NL	NL			NL
2-4m	630[#6]		NL										3	NL	NL			NL
>4m	NL		NL										3	NL	NL			NL
Field_ID																		
SB01_0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB01_2.9-3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB02_0.9-1.0	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SB02_3.9-4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB03_0.9-1.0	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
QA03	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3
SB03_Asphalt_0-0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB04_0.4-0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB04_4.4-4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB05_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SB05_4.9-5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB06_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
QA04	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<50	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3
SB06_4.9-5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB07_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SB07_1.6-1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB08_0.4-0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB08_3.9-4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB09_0.9-1.0	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
QA06	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SB09_4.9-5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB09_Concrete_0-0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS01	<10	<10	<50	<50	2370	330	2700	<10	<50	1720	760	2480	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS04	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SS05	<10	<10	80	80	<100	<100	80	<10	<50	150	<100	150	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SS06	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SS07	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SS08	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
QA01	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
SS09	<10	<10	160	160	180	<100	340	<10	<50	240	<100	240	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5

SB = soil bore, SS = sediment sample

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Shedule B7).
#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 50% bioavailability considered. Site-specific bioavailability should be considered where appropriate.
#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is present, or suspected to be present.
#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence of carcinogenic PAHs (should meet BaP TEQ HIL) & napthalene (should meet relevant HSL)
#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7:Derived soil HSL exceeds soil saturation concentration
#8:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Appendix B
Table A1
Soil and sediment analytical results - on-site: Human health

					PAH																			SVOCs												
				BTEX (Sum of Total) - Lab Calc	Polycylic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)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)	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	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				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	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005
DER (2017) Interim PFAS Guidelines - Health commercial/industrial																											100									
CRCCare Soil Direct Contact HSL-D Commercial / Industrial																				11000																
NEPM 2013 Table 1A(1) HIL D Comm/Ind																						*4000* #5														
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																																				
0-1m																				NL																
1-2m																				NL																
2-4m																				NL																
>4m																				NL																
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																																	
SB01_0.5-0.6	SB01	0.5-0.6	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0816	<0.0005	<0.0005	<0.0002	<0.0002	0.0011	0.0034	0.0169	0.0014	<0.0005
QA02	SB01	0.5-0.6	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0984	<0.0005	<0.0005	<0.0002	<0.0002	0.001	0.004	0.0164	0.0024	<0.0005
SB01_2.9-3.0	SB01	2.9-3	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0072	<0.0005	<0.0005	<0.0002	<0.0002	0.0002	<0.0002	0.0012	<0.0002	<0.0005
SB02_0.9-1.0	SB02	0.9-1	30/11/2016	<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	1.2	0.6	<0.0002	0.275	<0.0005	<0.0005	<0.0002	<0.0002	0.0027	0.0037	0.047	0.0166	<0.0005
SB02_3.9-4.0	SB02	3.9-4	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0138	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	0.0005	<0.0005
SB03_0.9-1.0	SB03	0.9-1	30/11/2016	<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	1.2	0.6	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
QA03	SB03	0.9-1	30/11/2016	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<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	-	-	-	-	-	-	-	-	-	-	-
SB03_Asphalt_0-0.08	SB03	0-0.08	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.035	<0.0005	<0.0005	<0.0002	<0.0002	0.0008	0.0005	0.0025	0.0005	<0.0005
SB04_0.4-0.5	SB04	0.4-0.5	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0399	<0.0005	<0.0005	<0.0002	<0.0002	0.004	0.0027	0.0287	0.0028	<0.0005
SB04_4.4-4.5	SB04	4.4-4.5	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005
SB05_0.4-0.5	SB05	0.4-0.5	1/12/2016	<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	1.2	0.6	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SB05_4.9-5.0	SB05	4.9-5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SB06_0.4-0.5	SB06	0.4-0.5	1/12/2016	<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	1.2	0.6	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
QA04	SB06	0.4-0.5	1/12/2016	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<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_4.9-5.0	SB06	4.9-5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SB07_0.4-0.5	SB07	0.4-0.5	1/12/2016	<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	1.2	0.6	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SB07_1.6-1.7	SB07	1.6-1.7	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SB08_0.4-0.5	SB08	0.4-0.5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0016	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SB08_3.9-4.0	SB08	3.9-4	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005
SB09_0.9-1.0	SB09	0.9-1	1/12/2016	<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	1.2	0.6	<0.0002	0.0025	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.0005
QA06	SB09	0.9-1	1/12/2016	<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	1.2	0.6	<0.0002	0.0018	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.0005
SB09_4.9-5.0	SB09	4.9-5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0061	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.0005
SB09_Concrete_0-0.2	SB09	0-0.2	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.182	<0.0005	<0.0005	<0.0002	<0.0002	0.0372	0.006	0.0758	0.0367	<0.0005
SS01	SS01		28/11/2016	<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	1.2	0.6	0.0006	0.027	<0.0005	<0.0005	<0.0002	<0.0002	0.0005	0.0002	0.0022	0.0019	<0.0005
SS02	SS02		28/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0012	0.0385	<0.0005	0.003	<0.0002	<0.0002	0.0004	<0.0002	0.0029	0.0007	0.0014
SS03	SS03		28/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0025	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005
SS04	SS04		28/11/2016	<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	1.2	0.6	<0.0002	0.0045	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005
SS05	SS05		28/11/2016	<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	1.2	0.6	<0.0002	0.003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005
SS06	SS06		28/11/2016	<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	1.2	0.6	<0.0002	0.0004	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS07	SS07		1/12/2016	<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	1.2	0.6	<0.0002	0.0035	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	0.0008	0.0003	<0.0002	<0.0005
SS08	SS08		1/12/2016	<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	1.2	0.6	0.0003	0.0509	<0.0005	<0.0005	<0.0002	<0.0002	0.0005	0.0005	0.004	0.002	0.0006
QA01	SS09		28/11/2016	<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	1.2	0.6	<0.0002	0.0011	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0005
SS09	SS09		28/11/2016	<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	1.2	0.6	<0.0002	0.0033	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0005

SB = soil bore, SS = sediment sample

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important a

#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

#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment shou

#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should c

#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#7:Derived soil HSL exceeds soil saturation concentration

#8:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Appendix B
Table A1
Soil and sediment analytical results - on-site: Human health

				PFAS																				Major Ions
				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 (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Potassium
				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				0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	10
DER (2017) Interim PFAS Guidelines - Health commercial/industrial									1000															
CRCCare Soil Direct Contact HSL-D Commercial / Industrial																								
NEPM 2013 Table 1A(1) HIL D Comm/Ind																								
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																								
0-1m																								
1-2m																								
2-4m																								
>4m																								
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																					
SB01_0.5-0.6	SB01	0.5-0.6	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0026	0.0019	<0.001	<0.0002	<0.0002	0.001	0.0049	<0.0002	0.0647	<0.0002	<0.0005	<0.0002	<0.0002	0.0979	0.0926	-
QA02	SB01	0.5-0.6	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0016	<0.001	<0.0002	<0.0002	0.001	0.0048	<0.0002	0.082	<0.0002	<0.0005	<0.0002	<0.0002	0.116	0.111	-
SB01_2.9-3.0	SB01	2.9-3	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.006	<0.0002	<0.0005	<0.0002	<0.0002	0.0082	0.0079	-
SB02_0.9-1.0	SB02	0.9-1	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0128	0.0057	0.004	<0.001	<0.0002	<0.0002	0.0035	0.0244	<0.0002	0.228	<0.0002	<0.0005	<0.0002	<0.0002	0.348	0.341	990
SB02_3.9-4.0	SB02	3.9-4	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	0.0125	<0.0002	<0.0005	<0.0002	<0.0002	0.0152	0.015	-
SB03_0.9-1.0	SB03	0.9-1	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003	390
QA03	SB03	0.9-1	30/11/2016	-	-	-	-	<0.01	<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-
SB03_Asphalt_0-0.08	SB03	0-0.08	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	0.0004	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0325	<0.0002	<0.0005	<0.0002	<0.0002	0.0381	0.0372	-
SB04_0.4-0.5	SB04	0.4-0.5	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.002	0.0041	0.004	<0.001	<0.0002	<0.0002	0.0014	0.0075	<0.0002	0.0112	<0.0002	<0.0005	<0.0002	<0.0002	0.0684	0.0617	-
SB04_4.4-4.5	SB04	4.4-4.5	30/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003	-
SB05_0.4-0.5	SB05	0.4-0.5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB05_4.9-5.0	SB05	4.9-5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB06_0.4-0.5	SB06	0.4-0.5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	570
QA04	SB06	0.4-0.5	1/12/2016	-	-	-	-	<0.01	<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-
SB06_4.9-5.0	SB06	4.9-5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB07_0.4-0.5	SB07	0.4-0.5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB07_1.6-1.7	SB07	1.6-1.7	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB08_0.4-0.5	SB08	0.4-0.5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	<0.0005	<0.0002	<0.0002	0.0016	0.0016	-
SB08_3.9-4.0	SB08	3.9-4	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003	-
SB09_0.9-1.0	SB09	0.9-1	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.0005	<0.0002	<0.0002	0.0025	0.0025	690
QA06	SB09	0.9-1	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.0005	<0.0002	<0.0002	0.0018	0.0018	-
SB09_4.9-5.0	SB09	4.9-5	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0055	<0.0002	<0.0005	<0.0002	<0.0002	0.0061	0.0061	-
SB09_Concrete_0-0.2	SB09	0-0.2	1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0028	0.0124	0.0123	0.021	<0.0002	<0.0002	0.0055	0.0898	<0.0002	0.106	0.0006	<0.0005	<0.0002	<0.0002	0.406	0.387	-
SS01	SS01		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.002	<0.0002	<0.001	0.0009	0.0006	0.0012	0.0018	0.0006	0.0248	<0.0002	<0.0005	<0.0002	<0.0002	0.0373	0.0344	20
SS02	SS02		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0094	0.0002	<0.0002	<0.001	<0.0002	0.0002	0.0003	0.0018	<0.0002	0.0356	0.0006	<0.0005	<0.0002	<0.0002	0.0577	0.0527	-
SS03	SS03		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	<0.0002	<0.0005	<0.0002	<0.0002	0.0025	0.0025	-
SS04	SS04		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0041	<0.0002	<0.0005	<0.0002	<0.0002	0.0045	0.0045	<10
SS05	SS05		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0027	<0.0002	<0.0005	<0.0002	<0.0002	0.003	0.003	<10
SS06	SS06		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0002	<0.0002	0.0004	0.0004	-
SS07	SS07		1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0032	<0.0002	<0.0005	<0.0002	<0.0002	0.0043	0.0035	<10
SS08	SS08		1/12/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0019	<0.0002	<0.001	<0.0002	<0.0002	0.0011	0.0021	<0.0002	0.0469	<0.0002	<0.0005	<0.0002	<0.0002	0.0613	0.0605	-
QA01	SS09		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.0005	<0.0002	<0.0002	0.0011	0.0011	-
SS09	SS09		28/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0028	<0.0002	<0.0005	<0.0002	<0.0002	0.0033	0.0033	60

SB = soil bore, SS = sediment sample
Env Stds Comments
#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important a
#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
#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment shou
#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should c
#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7:Derived soil HSL exceeds soil saturation concentration
#8:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Appendix B
Table A2
Soil and sediment analytical results on-site: Ecological and Intrusive maintenance workers

				TOC	Inorganics			Metals											TRH - NEPM 2013							TRH - NEPM 1999					BTEX & MAH				
				Total Organic Carbon	pH (Final)	Moisture	Moisture Content (dried @ 103°C)	Aluminium	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Silicon	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 - C 9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)
				%	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
EQL				0.5	0.1	1	1	50	5	1	2	5	50	5	0.1	2	1	5	10	10	50	50	100	100	50	10	50	100	100	50	0.2	0.5	0.5	0.5	0.5
CRCCare Soil Direct Contact Intrusive Works																				82000		62000	85000	120000							1100	120000	85000		
DEE (2016) Draft Management Guidance on PFOS and PFOA - ecological value																																			
CRCCare Soil HSL Vap.Int Intrusive Works,0 to <2m,Sand																				NL		NL									77	NL	NL		
CRCCare Soil HSL Vap.Int Intrusive Works,2 to <4m,Sand																				NL		NL									160	NL	NL		
NEPM 2013 EIL-Commercial/Industrial									160			85		1800		55		110																	
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil 0-2m																			*215*[#6]		*170*[#8]		*1700*	*3300*							*75*	*135*	*165*		
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																																
SB01_0.5-0.6	SB01	0.5-0.6	30/11/2016	-	7.9	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA02	SB01	0.5-0.6	30/11/2016	-	-	13.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB01_2.9-3.0	SB01	2.9-3	30/11/2016	-	-	8.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB02_0.9-1.0	SB02	0.9-1	30/11/2016	<0.5	7.8	21	-	12,600	<5	<1	14	8	18,100	10	<0.1	7	18,600	10	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SB02_3.9-4.0	SB02	3.9-4	30/11/2016	-	-	8.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB03_0.9-1.0	SB03	0.9-1	30/11/2016	<0.5	8.1	17.1	-	11,900	6	<1	32	11	46,900	20	<0.1	12	13,000	8	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
QA03	SB03	0.9-1	30/11/2016	-	-	-	15	-	5.8	<0.4	30	9.2	-	20	<0.1	7.5	-	9.5	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<50	<0.1	<0.1	<0.1	<0.1	<0.2
SB03_Asphalt_0-0.08	SB03	0-0.08	30/11/2016	-	-	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB04_0.4-0.5	SB04	0.4-0.5	30/11/2016	-	8.1	15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB04_4.4-4.5	SB04	4.4-4.5	30/11/2016	-	-	6.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB05_0.4-0.5	SB05	0.4-0.5	1/12/2016	-	-	12.6	-	-	<5	<1	28	16	-	16	<0.1	14	-	29	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SB05_4.9-5.0	SB05	4.9-5	1/12/2016	-	-	6.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB06_0.4-0.5	SB06	0.4-0.5	1/12/2016	<0.5	-	20.2	-	12,400	<5	<1	34	8	43,500	14	<0.1	8	16,600	23	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
QA04	SB06	0.4-0.5	1/12/2016	-	-	-	17	-	2.8	<0.4	17	8.8	-	11	<0.1	12	-	31	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<50	<0.1	<0.1	<0.1	<0.1	<0.2
SB06_4.9-5.0	SB06	4.9-5	1/12/2016	-	-	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB07_0.4-0.5	SB07	0.4-0.5	1/12/2016	-	-	13	-	-	9	<1	46	11	-	19	<0.1	13	-	19	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SB07_1.6-1.7	SB07	1.6-1.7	1/12/2016	-	-	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB08_0.4-0.5	SB08	0.4-0.5	1/12/2016	-	9.2	20.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB08_3.9-4.0	SB08	3.9-4	1/12/2016	-	-	8.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB09_0.9-1.0	SB09	0.9-1	1/12/2016	<0.5	-	23.1	-	10,300	<5	<1	12	9	34,100	11	<0.1	23	16,900	58	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
QA06	SB09	0.9-1	1/12/2016	-	-	25.2	-	-	5	<1	11	9	-	10	<0.1	27	-	62	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SB09_4.9-5.0	SB09	4.9-5	1/12/2016	-	10.3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB09_Concrete_0-0.2	SB09	0-0.2	1/12/2016	-	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS01	SS01		28/11/2016	5.2	7.8	11.3	-	10,200	7	<1	25	18	24,100	17	<0.1	13	510	498	<10	<10	<50	<50	*2370*	330	2700	<10	<50	1720	760	2480	<0.2	<0.5	<0.5	<0.5	<0.5
SS02	SS02		28/11/2016	-	6.9	24.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS04	SS04		28/11/2016	0.7	6.9	26.4	-	5000	<5	<1	22	<5	16,600	10	<0.1	3	97	20	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SS05	SS05		28/11/2016	0.6	-	26.4	-	7240	<5	<1	31	8	26,600	10	<0.1	6	283	22	<10	<10	80	80	<100	<100	80	<10	<50	150	<100	150	<0.2	<0.5	<0.5	<0.5	<0.5
SS06	SS06		28/11/2016	-	-	10.4	-	-	<5	<1	18	9	-	24	<0.1	8	-	33	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SS07	SS07		1/12/2016	<0.5	-	23.9	-	3780	5	<1	51	9	27,900	10	<0.1	5	114	23	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SS08	SS08		1/12/2016	-	7.4	10.8	-	-	<5	<1	30	10	-	18	<0.1	8	-	18	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
QA01	SS09		28/11/2016	-	-	38.7	-	-	<5	<1	20	16	-	20	<0.1	13	-	173	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5
SS09	SS09		28/11/2016	1.9	7	37.1	-	19,500	<5	<1	19	15	33,500	18	<0.1	12	3780	168	<10	<10	160	160	180	<100	340	<10	<50	240	<100	240	<0.2	<0.5	<0.5	<0.5	<0.5

SB = soil bore, SS = sediment sample

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Shedule B7).

#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 50% bioavailability considered. Site-specific bioavailability should be considered where appropriate.

#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is present, or suspected to be present.

#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence of carcinogenic PAHs (should meet BaP TEQ HIL) & napthalene (should meet relevant HSL)

#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#7:Derived soil HSL exceeds soil saturation concentration

#8:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Appendix B
Table A2
Soil and sediment analytical results on-site: Ecological and Intrusive maintenance workers

						PAH																			SVOCs										
				Xylene Total	BTEX (Sum of Total) - Lab Calc	Polycylic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)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)	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	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				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	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002
CRCCare Soil Direct Contact Intrusive Works				130000																	29000														
DEE (2016) Draft Management Guidance on PFOS and PFOA - ecological value																																			
CRCCare Soil HSL Vap.Int Intrusive Works,0 to <2m,Sand				NL																	NL														
CRCCare Soil HSL Vap.Int Intrusive Works,2 to <4m,Sand				NL																	NL														
NEPM 2013 EIL-Commercial/Industrial																	370																		
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil 0-2m				*180*								*1.4*																							
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																																
SB01_0.5-0.6	SB01	0.5-0.6	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0816	<0.0005	<0.0005	<0.0002	<0.0002	0.0011	0.0034	0.0169
QA02	SB01	0.5-0.6	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0984	<0.0005	<0.0005	<0.0002	<0.0002	0.001	0.004	0.0164
SB01_2.9-3.0	SB01	2.9-3	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0072	<0.0005	<0.0005	<0.0002	<0.0002	0.0002	<0.0002	0.0012
SB02_0.9-1.0	SB02	0.9-1	30/11/2016	<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	1.2	0.6	<0.0002	0.275	<0.0005	<0.0005	<0.0002	<0.0002	0.0027	0.0037	0.047
SB02_3.9-4.0	SB02	3.9-4	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0138	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0013
SB03_0.9-1.0	SB03	0.9-1	30/11/2016	<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	1.2	0.6	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
QA03	SB03	0.9-1	30/11/2016	<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	1.2	0.6	-	-	-	-	-	-	-	-	-
SB03_Asphalt_0-0.08	SB03	0-0.08	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.035	<0.0005	<0.0005	<0.0002	<0.0002	0.0008	0.0005	0.0025
SB04_0.4-0.5	SB04	0.4-0.5	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0399	<0.0005	<0.0005	<0.0002	<0.0002	0.004	0.0027	0.0287
SB04_4.4-4.5	SB04	4.4-4.5	30/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003
SB05_0.4-0.5	SB05	0.4-0.5	1/12/2016	<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	1.2	0.6	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB05_4.9-5.0	SB05	4.9-5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB06_0.4-0.5	SB06	0.4-0.5	1/12/2016	<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	1.2	0.6	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
QA04	SB06	0.4-0.5	1/12/2016	<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	1.2	0.6	-	-	-	-	-	-	-	-	-
SB06_4.9-5.0	SB06	4.9-5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB07_0.4-0.5	SB07	0.4-0.5	1/12/2016	<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	1.2	0.6	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB07_1.6-1.7	SB07	1.6-1.7	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB08_0.4-0.5	SB08	0.4-0.5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0016	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB08_3.9-4.0	SB08	3.9-4	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003
SB09_0.9-1.0	SB09	0.9-1	1/12/2016	<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	1.2	0.6	<0.0002	0.0025	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0012
QA06	SB09	0.9-1	1/12/2016	<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	1.2	0.6	<0.0002	0.0018	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.001
SB09_4.9-5.0	SB09	4.9-5	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0061	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0006
SB09_Concrete_0-0.2	SB09	0-0.2	1/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.182	<0.0005	<0.0005	<0.0002	<0.0002	0.0372	0.006	0.0758
SS01	SS01		28/11/2016	<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	1.2	0.6	0.0006	0.027	<0.0005	<0.0005	<0.0002	<0.0002	0.0005	0.0002	0.0022
SS02	SS02		28/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0012	0.0385	<0.0005	0.003	<0.0002	<0.0002	0.0004	<0.0002	0.0029
SS04	SS04		28/11/2016	<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	1.2	0.6	<0.0002	0.0045	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0004
SS05	SS05		28/11/2016	<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	1.2	0.6	<0.0002	0.003	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003
SS06	SS06		28/11/2016	<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	1.2	0.6	<0.0002	0.0004	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS07	SS07		1/12/2016	<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	1.2	0.6	<0.0002	0.0035	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	0.0008	0.0003
SS08	SS08		1/12/2016	<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	1.2	0.6	0.0003	0.0509	<0.0005	<0.0005	<0.0002	<0.0002	0.0005	0.0005	0.004
QA01	SS09		28/11/2016	<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	1.2	0.6	<0.0002	0.0011	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
SS09	SS09		28/11/2016	<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	1.2	0.6	<0.0002	0.0033	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0005

SB = soil bore, SS = sediment sample

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important a

#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 !

#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment shou

#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should co

#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#7:Derived soil HSL exceeds soil saturation concentration

#8:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Appendix B
Table A2
Soil and sediment analytical results on-site: Ecological and Intrusive maintenance workers

				PFAS																						Major Ions
				Perfluoropentanoic 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 (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Potassium
				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				0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	10
CRCCare Soil Direct Contact Intrusive Works																										
DEE (2016) Draft Management Guidance on PFOS and PFOA - ecological value											1								6.6							
CRCCare Soil HSL Vap.Int Intrusive Works,0 to <2m,Sand																										
CRCCare Soil HSL Vap.Int Intrusive Works,2 to <4m,Sand																										
NEPM 2013 EIL-Commercial/Industrial																										
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil 0-2m																										
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																							
SB01_0.5-0.6	SB01	0.5-0.6	30/11/2016	0.0014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0026	0.0019	<0.001	<0.0002	<0.0002	0.001	0.0049	<0.0002	0.0647	<0.0002	<0.0005	<0.0002	<0.0002	0.0979	0.0926	-
QA02	SB01	0.5-0.6	30/11/2016	0.0024	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0016	<0.001	<0.0002	<0.0002	0.001	0.0048	<0.0002	0.082	<0.0002	<0.0005	<0.0002	<0.0002	0.116	0.111	-
SB01_2.9-3.0	SB01	2.9-3	30/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.006	<0.0002	<0.0005	<0.0002	<0.0002	0.0082	0.0079	-
SB02_0.9-1.0	SB02	0.9-1	30/11/2016	0.0166	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0128	0.0057	0.004	<0.001	<0.0002	<0.0002	0.0035	0.0244	<0.0002	0.228	<0.0002	<0.0005	<0.0002	<0.0002	0.348	0.341	990
SB02_3.9-4.0	SB02	3.9-4	30/11/2016	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	0.0125	<0.0002	<0.0005	<0.0002	<0.0002	0.0152	0.015	-
SB03_0.9-1.0	SB03	0.9-1	30/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003	390
QA03	SB03	0.9-1	30/11/2016	-	-	-	-	-	-	<0.01	<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-
SB03_Asphalt_0-0.08	SB03	0-0.08	30/11/2016	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	0.0004	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0325	<0.0002	<0.0005	<0.0002	<0.0002	0.0381	0.0372	-
SB04_0.4-0.5	SB04	0.4-0.5	30/11/2016	0.0028	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.002	0.0041	0.004	<0.001	<0.0002	<0.0002	0.0014	0.0075	<0.0002	0.0112	<0.0002	<0.0005	<0.0002	<0.0002	0.0684	0.0617	-
SB04_4.4-4.5	SB04	4.4-4.5	30/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003	-
SB05_0.4-0.5	SB05	0.4-0.5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB05_4.9-5.0	SB05	4.9-5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB06_0.4-0.5	SB06	0.4-0.5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	570
QA04	SB06	0.4-0.5	1/12/2016	-	-	-	-	-	-	<0.01	<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-
SB06_4.9-5.0	SB06	4.9-5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB07_0.4-0.5	SB07	0.4-0.5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB07_1.6-1.7	SB07	1.6-1.7	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB08_0.4-0.5	SB08	0.4-0.5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	<0.0005	<0.0002	<0.0002	0.0016	0.0016	-
SB08_3.9-4.0	SB08	3.9-4	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003	-
SB09_0.9-1.0	SB09	0.9-1	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.0005	<0.0002	<0.0002	0.0025	0.0025	690
QA06	SB09	0.9-1	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.0005	<0.0002	<0.0002	0.0018	0.0018	-
SB09_4.9-5.0	SB09	4.9-5	1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0055	<0.0002	<0.0005	<0.0002	<0.0002	0.0061	0.0061	-
SB09_Concrete_0-0.2	SB09	0-0.2	1/12/2016	0.0367	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0028	0.0124	0.0123	0.021	<0.0002	<0.0002	0.0055	0.0898	<0.0002	0.106	0.0006	<0.0005	<0.0002	<0.0002	0.406	0.387	-
SS01	SS01		28/11/2016	0.0019	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.002	<0.0002	<0.001	0.0009	0.0006	0.0012	0.0018	0.0006	0.0248	<0.0002	<0.0005	<0.0002	<0.0002	0.0373	0.0344	20
SS02	SS02		28/11/2016	0.0007	0.0014	<0.0005	<0.0005	<0.0005	<0.0005	0.0094	0.0002	<0.0002	<0.001	<0.0002	0.0002	0.0003	0.0018	<0.0002	0.0356	0.0006	<0.0005	<0.0002	<0.0002	0.0577	0.0527	-
SS04	SS04		28/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0041	<0.0002	<0.0005	<0.0002	<0.0002	0.0045	0.0045	<10
SS05	SS05		28/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0027	<0.0002	<0.0005	<0.0002	<0.0002	0.003	0.003	<10
SS06	SS06		28/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0002	<0.0002	0.0004	0.0004	-
SS07	SS07		1/12/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0032	<0.0002	<0.0005	<0.0002	<0.0002	0.0043	0.0035	<10
SS08	SS08		1/12/2016	0.002	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0019	<0.0002	<0.001	<0.0002	<0.0002	0.0011	0.0021	<0.0002	0.0469	<0.0002	<0.0005	<0.0002	<0.0002	0.0613	0.0605	-
QA01	SS09		28/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.0005	<0.0002	<0.0002	0.0011	0.0011	-
SS09	SS09		28/11/2016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0028	<0.0002	<0.0005	<0.0002	<0.0002	0.0033	0.0033	60

SB = soil bore, SS = sediment sample

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important a

#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

#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment shou

#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should c

#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#7:Derived soil HSL exceeds soil saturation concentration

#8:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

Appendix B
Table A3
Soil and sediment analytical results - off-site

				TOC	Inorganics			Metals			PFAS																						
				Total Organic Carbon	pH (Final)	Moisture	Silica	Aluminium	Iron	Silicon	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	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic 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	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)
				%	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
EQL				0.5	0.1	1	1	50	50	1	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002
DER (2017) Interim PFAS Guidelines - Health residential											4															40							
DEE (2016) Draft Management Guidance on PFOS and PFOA - ecological value																										1							
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																														
SB10_0.3-0.4	SB10	0.3-0.4	8/12/2016	-	-	19	-	-	-	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB10_0.6-0.7	SB10	0.6-0.7	8/12/2016	-	-	14.1	-	-	-	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB10_1.2-1.3	SB10	1.2-1.3	8/12/2016	<0.5	-	10.5	18,600	8530	15,700	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB11_0.2-0.3	SB11	0.2-0.3	9/12/2016	-	-	16	-	-	-	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB11_0.5-0.6	SB11	0.5-0.6	9/12/2016	-	-	13.1	-	-	-	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB11_1.2-1.3	SB11	1.2-1.3	9/12/2016	-	-	20.2	-	-	-	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB12_0.8-0.9	SB12	0.8-0.9	9/12/2016	0.8	-	18.5	24,800	17,400	16,500	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SB12_0-0.1	SB12	0-0.1	9/12/2016	-	8.6	17.2	-	-	-	-	0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS10	SS10		1/12/2016	<0.5	-	24.4	-	4760	12,100	740	0.0049	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS11	SS11		8/12/2016	-	7.4	35.6	-	-	-	-	0.021	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	0.0002	0.0011	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0002	<0.001	<0.0002	0.0004	<0.0002	0.0003	0.0003
SS12	SS12		8/12/2016	-	7.6	30.1	-	-	-	-	0.005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS13	SS13		8/12/2016	1.2	8	19.6	1570	7330	28,500	-	0.0117	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS14	SS14		8/12/2016	-	8	15	-	-	-	-	0.0118	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS15	SS15		8/12/2016	-	-	26.1	-	-	-	-	0.0014	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS16	SS16		8/12/2016	<0.5	-	32.1	1650	10,300	31,400	-	0.0034	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS17	SS17		8/12/2016	3.5	-	29.4	2020	11,400	24,500	-	0.0026	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

SB = soil bore, SS = sediment sample
Env Stds Comments

Appendix B
Table A3
Soil and sediment analytical results - off-site

												Major Ions
				Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Potassium
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	10
DER (2017) Interim PFAS Guidelines - Health residential												
DEE (2016) Draft Management Guidance on PFOS and PFOA - ecological value					6.6							
Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time									
SB10_0.3-0.4	SB10	0.3-0.4	8/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB10_0.6-0.7	SB10	0.6-0.7	8/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB10_1.2-1.3	SB10	1.2-1.3	8/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	320
SB11_0.2-0.3	SB11	0.2-0.3	9/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB11_0.5-0.6	SB11	0.5-0.6	9/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB11_1.2-1.3	SB11	1.2-1.3	9/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	-
SB12_0.8-0.9	SB12	0.8-0.9	9/12/2016	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	830
SB12_0-0.1	SB12	0-0.1	9/12/2016	<0.0002	0.0005	<0.0002	<0.0005	<0.0002	<0.0002	0.0005	0.0005	-
SS10	SS10		1/12/2016	<0.0002	0.0046	<0.0002	<0.0005	<0.0002	<0.0002	0.0051	0.0051	20
SS11	SS11		8/12/2016	<0.0002	0.0199	<0.0002	<0.0005	<0.0002	<0.0002	0.023	0.0224	-
SS12	SS12		8/12/2016	<0.0002	0.0048	<0.0002	<0.0005	<0.0002	<0.0002	0.005	0.005	-
SS13	SS13		8/12/2016	<0.0002	0.0112	<0.0002	<0.0005	<0.0002	<0.0002	0.012	0.012	370
SS14	SS14		8/12/2016	<0.0002	0.0114	<0.0002	<0.0005	<0.0002	<0.0002	0.0118	0.0118	-
SS15	SS15		8/12/2016	<0.0002	0.0014	<0.0002	<0.0005	<0.0002	<0.0002	0.0014	0.0014	-
SS16	SS16		8/12/2016	<0.0002	0.0034	<0.0002	<0.0005	<0.0002	<0.0002	0.0034	0.0034	670
SS17	SS17		8/12/2016	<0.0002	0.0026	<0.0002	<0.0005	<0.0002	<0.0002	0.0026	0.0026	780

SB = soil bore, SS = sediment sample
Env Stds Comments

Armidale soil and sediment off site , 17/02/2017
Location_Code In('SS16' , 'SS17' , 'SS15' , 'SS14' , 'SS13' , 'SS12' , 'SS11' , 'SS10' , 'SB10' , 'SB11' , 'SB12')

Appendix B
Table B
ASLP analytical results

					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	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic 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 (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
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	0.01	0.01
WA DER (2017) Drinking water quality						5[#1]															50[#1]														
WA DER (2017) Ecolgocial freshwater						*0.0023 [#1]*															*190 [#1]*														
WA DER (2017) Recreational water						50[#1]															500[#1]														
Field_ID	Location_Code	Sample Depth (m)	Sampled_Date	Matrix_Description																															
MW04_1.9-2.0	MW04	1.9-2	01-Dec-16	TCLP	<0.02	*0.4*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.11	<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	*0.29*	<0.02	<0.05	<0.02	<0.02	0.4	0.4
MW1_0.5-0.6	MW01	0.5-0.6	29-Nov-16	TCLP	<0.02	*0.59*	<0.05	<0.05	<0.02	<0.02	0.03	<0.02	*0.37*	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	0.03	<0.1	<0.02	<0.02	<0.02	0.06	<0.02	*0.22*	<0.02	<0.05	<0.02	<0.02	0.76	0.73
SB01_0.5-0.6	SB01	0.5-0.6	30-Nov-16	ASLP	<0.02	*6.53*	<0.05	<0.05	<0.02	<0.02	0.06	0.17	*0.73*	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	0.08	<0.1	<0.02	<0.02	0.02	0.14	<0.02	*5.8*	<0.02	<0.05	<0.02	<0.02	7.21	6.96
SB02_0.9-1.0	SB02	0.9-1	30-Nov-16	ASLP	<0.02	*13.6*	<0.05	<0.05	<0.02	<0.02	0.12	0.15	*1.76*	0.46	<0.05	<0.05	<0.05	<0.05	<0.05	0.85	0.23	0.16	<0.1	<0.02	<0.02	0.07	0.6	<0.02	*11.8*	<0.02	<0.05	<0.02	<0.02	16.2	15.9
SB03_0.9-1.0	SB03	0.9-1	30-Nov-16	ASLP	<0.02	0.03	<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	0.03	<0.02	<0.05	<0.02	<0.02	0.03	0.03
SB04_0.4-0.5	SB04	0.4-0.5	30-Nov-16	ASLP	<0.02	*1.4*	<0.05	<0.05	<0.02	<0.02	0.14	0.1	*0.93*	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	0.14	<0.1	<0.02	<0.02	0.03	0.16	<0.02	*0.47*	<0.02	<0.05	<0.02	<0.02	2.19	1.95
SB08_0.4-0.5	SB08	0.4-0.5	01-Dec-16	ASLP	<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	<0.01	<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
SB09_4.9-5.0	SB09	4.9-5	01-Dec-16	ASLP	<0.02	*0.49*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.03	<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	*0.46*	<0.02	<0.05	<0.02	<0.02	0.5	0.5
SB12_0.0-0.1	SB12	0-0.1	09-Dec-16	ASLP	<0.02	0.02	<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	0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.02
SS01	SS01		28-Nov-16	ASLP	<0.02	*1.41*	<0.05	<0.05	<0.02	<0.02	0.04	<0.02	0.08	0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.02	<0.1	0.05	<0.02	<0.02	0.03	0.04	*1.33*	<0.02	<0.05	<0.02	<0.02	1.68	1.59
SS02	SS02		28-Nov-16	ASLP	0.16	*1.98*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.04	0.03	0.08	<0.05	<0.05	<0.05	<0.05	0.06	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	0.08	<0.02	*1.94*	0.02	<0.05	<0.02	<0.02	2.43	2.25
SS04	SS04		28-Nov-16	ASLP	<0.02	0.12	<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	0.12	<0.02	<0.05	<0.02	<0.02	0.12	0.12
SS08	SS08		01-Dec-16	ASLP	<0.02	*2.52*	<0.05	<0.05	<0.02	<0.02	0.03	0.04	*0.16*	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.02	<0.1	<0.02	<0.02	<0.02	0.07	<0.02	*2.36*	<0.02	<0.05	<0.02	<0.02	2.78	2.72
SS09	SS09		28-Nov-16	ASLP	<0.02	*0.28*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.05	<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	*0.23*	<0.02	<0.05	<0.02	<0.02	0.28	0.28
SS11	SS11		08-Dec-16	ASLP	<0.02	*0.52*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.03	<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	*0.49*	<0.02	<0.05	<0.02	<0.02	0.52	0.52
SS12	SS12		08-Dec-16	ASLP	<0.02	*0.2*	<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	*0.2*	<0.02	<0.05	<0.02	<0.02	0.2	0.2
SS13	SS13		08-Dec-16	ASLP	<0.02	*0.42*	<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	*0.4*	<0.02	<0.05	<0.02	<0.02	0.42	0.42
SS14	SS14		08-Dec-16	ASLP	<0.02	*0.5*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.03	<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	*0.47*	<0.02	<0.05	<0.02	<0.02	0.51	0.51

Env Stds Comments
#1:WA DER 2017 - PFC Guidelines, dilution factor of 10 applied

Appendix B
Table C
Groundwater and surface water analytical results

			Field Parameters						Inorganics			Metals								TRH - NEPM 2013							TRH - NEPM 1999					BTEX & MA		
			Standing Water Level	DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)	Bicarbonate	Carbonate	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	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 - C 9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total)	Benzene	Toluene	Ethylbenzene
			mtoc	mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL									10	1	1	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	20	20	100	100	100	100	100	20	50	100	50	50	1	2	2
CRCCare GW HSL for vap.int Intrusive Maint. - Sand >8m																					NL		NL									NL	NL	NL
NEPM 2013 Table 1A(4) HSL A/B Res GW for Vapour Intrusion, Sand >8m																				1000[#1]		1000[#2]										900	NL	NL
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand >8m																				7000[#1]		NL										5000	NL	NL
NEPM 2013 Table 1C GILs, Drinking Water (inclusive of WA DER PFAS criterion)												0.01	0.002[#3]		2[#3]	0.01[#3]	0.001	0.02[#3]														1	800	300
NEPM 2013 Table 1C GILs, Fresh Waters (inclusive of WA DER PFAS criterion)													0.0002[#3]		0.0014[#3]	0.0034[#3]	0.00006[#4]	0.011[#3]	0.008[#3]													950		
NHMRC Recreational Guidelines 2008 (inclusive of WA DER PFAS criterion)												*0.1*	*0.02*		*20*	*0.1*	*0.01*	*0.2*														*10*	*8000*	*3000*
Location_Code	Field_ID	Sampled_Date																																
GW977466	GW977466	01/12/2016	-	-	-	-	-	-	763	316	<1	<0.001	<0.0001	<0.001	0.021	<0.001	<0.0001	0.001	0.082	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
MW01	MW01	08/12/2016	13.985	4.8	1610	6.11	294.2	18.7	1060	425	<1	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	0.01	0.041	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
MW01	QA102	08/12/2016	-	-	-	-	-	-	-	-	-	<0.001	<0.0002	<0.001	0.003	<0.001	<0.0001	0.01	0.041	<20	<20	<50	<50	<100	<100	-	<20	<50	<100	<100	<100	<1	<1	<1
MW02	MW02	08/12/2016	14.732	1.97	1178	6.14	294.5	18.2	857	291	<1	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	0.008	0.03	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
MW03	MW03	08/12/2016	12.515	1.85	1414	6.78	250.4	18.4	1040	361	<1	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	0.004	0.04	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
MW04	MW04	08/12/2016	12.802	2.13	775	6.57	249.8	17.1	464	282	<1	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.003	0.013	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
SW01	SW01	28/11/2016	-	-	-	-	-	-	137	39	<1	0.004	<0.0001	<0.001	0.001	0.001	<0.0001	0.002	<0.005	<20	<20	<100	<100	120	<100	120	<20	<50	<100	80	80	<1	<2	<2
SW02	QA101	28/11/2016	-	-	-	-	-	-	-	-	-	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	0.001	<0.005	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
SW02	SW02	28/11/2016	-	-	-	-	-	-	137	45	<1	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.002	<0.005	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
SW03	SW03	01/12/2016	-	-	-	-	-	-	245	51	<1	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	0.001	<0.005	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
SW04	SW04	08/12/2016	-	-	-	-	-	-	229	91	<1	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.004	<0.005	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<1	<2	<2
SW05	SW05	01/12/2016	-	-	-	-	-	-	191	45	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW06	SW06	08/12/2016	-	-	-	-	-	-	65	48	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW07	SW07	08/12/2016	-	-	-	-	-	-	333	48	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	SW08	08/12/2016	-	-	-	-	-	-	81	56	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Env Stds Comments
#1:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#2:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#3:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC & ARMCANZ (2000) for site specific hardness guidance
#4:Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZECC & ARMCANZ (2000) for further guidance.
#5: WA DER 2017 - Ecological PFC 99% species protection guidelines
#6: WA DER 2017 - Drinking water guideline, based on enHealth (2016) recommendations
#7: WA DER 2017 - Recreational waters guideline, based on enHealth (2016) recommendations

Appendix B
Table C
Groundwater and surface water analytical results

			H				PAH																		PFAS																	
			Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Polycylic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Benzo(a)pyrene TEQ (zero)	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	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic 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
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			2	2	2	1	0.5	1	1	1	1	1	0.5	1	1	1	1	1	1	1	1	1	1	0.0005	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
CRCCare GW HSL for vap.int Intrusive Maint. - Sand >8m					NL																																					
NEPM 2013 Table 1A(4) HSL A/B Res GW for Vapour Intrusion, Sand >8m					NL																	NL																				
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand >8m					NL																	NL																				
NEPM 2013 Table 1C GILs, Drinking Water (inclusive of WA DER PFAS criterion)					600								0.01													0.5 [#6]															5 [#6]	
NEPM 2013 Table 1C GILs, Fresh Waters (inclusive of WA DER PFAS criterion)			350																			16				0.00023 [#5]															19	
NHMRC Recreational Guidelines 2008 (inclusive of WA DER PFAS criterion)					6000																					5 [#7]															50[#7]	
Location_Code	Field_ID	Sampled_Date																																								
GW977466	GW977466	01/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	-	0.2	<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	0.02	<0.02
MW01	MW01	08/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	-	0.51	<0.05	<0.05	<0.02	<0.02	0.23	0.02	0.32	0.39	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.14
MW01	QA102	08/12/2016	<1	<2	<3	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<0.01	-	<0.01	-	-	-	0.17	-	0.21[#1]	0.28[#1]	<0.01	<0.05	-	<0.05	-	<0.05	0.03[#1]	-
MW02	MW02	08/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	-	0.19	<0.05	<0.05	<0.02	<0.02	0.03	<0.02	0.09	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	<0.02
MW03	MW03	08/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	-	1.21	<0.05	<0.05	<0.02	<0.02	0.45	<0.02	0.55	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.38
MW04	MW04	08/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	-	0.03	<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
SW01	SW01	28/11/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	<0.02	18.1	<0.05	<0.05	<0.02	<0.02	0.29	0.21	3.11	1.48	0.54	<0.05	<0.05	<0.05	<0.05	5.27	0.95	0.36
SW02	QA101	28/11/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	<0.02	0.82	<0.05	<0.05	<0.02	<0.02	0.03	<0.02	0.17	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.02
SW02	SW02	28/11/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	<0.02	0.79	<0.05	<0.05	<0.02	<0.02	0.03	<0.02	0.18	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.02
SW03	SW03	01/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	<0.02	1.04	<0.05	<0.05	<0.02	<0.02	0.05	<0.02	0.25	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.04
SW04	SW04	08/12/2016	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0005	-	10.2	<0.05	<0.05	<0.02	<0.02	0.29	0.26	2.28	1.08	<0.05	<0.05	<0.05	<0.05	<0.05	0.96	0.43	0.29
SW05	SW05	01/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	<0.05	<0.05	<0.02	<0.02	0.1	0.07	0.71	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	0.18	0.1
SW06	SW06	08/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.13	<0.05	<0.05	<0.02	<0.02	0.11	0.09	0.8	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	0.1
SW07	SW07	08/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.92	<0.05	<0.05	<0.02	<0.02	0.04	<0.02	0.26	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.04
SW08	SW08	08/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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

Env Stds Comments
#1:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#2:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#3:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC & ARMCANZ (200
#4:Chemical for which possible bioaccumulation and secondary poisoning effects should
#5: WA DER 2017 - Ecological PFC 99% species protection guidelines
#6: WA DER 2017 - Drinking water guideline, based on enHealth (2016) recommendatior
#7: WA DER 2017 - Recreational waters guideline, based on enHealth (2016) recommenc

Appendix B
Table C
Groundwater and surface water analytical results

																	Alkalinity		Major Ions								
			Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Sulphate (Filtered)	Ionic Balance
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	mg/L	%
EQL			0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01	1	1	1	1	1	0.01	1	1	0.01	1	0.01
CRCCare GW HSL for vap.int Intrusive Maint. - Sand >8m																											
NEPM 2013 Table 1A(4) HSL A/B Res GW for Vapour Intrusion, Sand >8m																											
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand >8m																											
NEPM 2013 Table 1C GILs, Drinking Water (inclusive of WA DER PFAS criterion)																										500	
NEPM 2013 Table 1C GILs, Fresh Waters (inclusive of WA DER PFAS criterion)																											
NHMRC Recreational Guidelines 2008 (inclusive of WA DER PFAS criterion)																										*5000*	
Location_Code	Field_ID	Sampled_Date																									
GW977466	GW977466	01/12/2016	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.14	<0.02	<0.05	<0.02	<0.02	0.24	0.24	<1	316	112	54	58	13.4	2	66	13.3	266	0.34
MW01	MW01	08/12/2016	<0.1	<0.02	<0.02	<0.02	0.06	0.35	<0.02	0.19	<0.02	<0.05	<0.02	<0.02	1.73	1.57	<1	425	188	319	77	21	2	85	19.5	170	3.86
MW01	QA102	08/12/2016	0.14	<0.01	-	<0.01	0.04$^{\#1}$	0.48$^{\#1}$	<0.01	0.25$^{\#1}$	<0.05	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	MW02	08/12/2016	<0.1	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.1	<0.02	<0.05	<0.02	<0.02	0.29	0.29	<1	291	120	57	70	15.6	2	82	15.4	394	0.83
MW03	MW03	08/12/2016	<0.1	<0.02	<0.02	<0.02	0.05	0.39	<0.02	0.66	<0.02	<0.05	<0.02	<0.02	2.63	2.25	<1	361	175	148	73	19.4	3	80	18.3	383	2.83
MW04	MW04	08/12/2016	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	0.03	0.03	<1	282	89	45	41	10.4	2	50	10	170	1.96
SW01	SW01	28/11/2016	<0.1	0.08	-	<0.02	0.54	1.88	0.18	15	0.03	<0.05	<0.02	<0.02	29.9	29.1	<1	39	7	2	4	1.13	1	12	1.23	14	-
SW02	QA101	28/11/2016	<0.1	<0.02	-	<0.02	<0.02	0.06	<0.02	0.65	<0.02	<0.05	<0.02	<0.02	0.96	0.94	-	-	-	-	-	-	-	-	-	-	-
SW02	SW02	28/11/2016	<0.1	<0.02	-	<0.02	<0.02	0.05	<0.02	0.61	<0.02	<0.05	<0.02	<0.02	0.92	0.9	<1	45	8	1	1	0.93	4	11	1.06	<1	-
SW03	SW03	01/12/2016	<0.1	<0.02	-	<0.02	<0.02	0.07	<0.02	0.79	<0.02	<0.05	<0.02	<0.02	1.24	1.2	<1	51	8	4	3	1.17	3	13	1.29	2	-
SW04	SW04	08/12/2016	<0.1	<0.02	<0.02	<0.02	0.38	1.08	<0.02	7.9	<0.02	<0.05	<0.02	<0.02	15	14.4	<1	91	17	7	7	2.02	2	17	2.22	<1	-
SW05	SW05	01/12/2016	<0.1	<0.02	<0.02	<0.02	0.08	0.33	<0.02	2.99	<0.02	<0.05	<0.02	<0.02	4.83	4.66	<1	48	9	5	3	1.14	3	13	1.34	2	-
SW06	SW06	08/12/2016	<0.1	<0.02	<0.02	<0.02	0.09	0.28	<0.02	2.33	<0.02	<0.05	<0.02	<0.02	4.11	3.92	<1	48	8	5	4	1.1	2	9	1.17	<1	-
SW07	SW07	08/12/2016	<0.1	<0.02	<0.02	<0.02	<0.02	0.1	<0.02	0.66	<0.02	<0.05	<0.02	<0.02	1.19	1.15	<1	48	10	12	4	1.55	3	16	1.6	12	-
SW08	SW08	08/12/2016	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<1	56	12	10	6	1.57	2	10	1.58	8	-

Env Stds Comments

#1:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

#2:To obtain F2 subtract napthalene from the >C10 - C16 fraction.

#3:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC & ARMCANZ (2000

#4:Chemical for which possible bioaccumulation and secondary poisoning effects should

#5: WA DER 2017 - Ecological PFC 99% species protection guidelines

#6: WA DER 2017 - Drinking water guideline, based on enHealth (2016) recommendatior

#7: WA DER 2017 - Recreational waters guideline, based on enHealth (2016) recommenc

Appendix C – Field Sampling Sheets

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW01
Project Number: 21-25583-04	Sample ID: "
Project Name: Armidale Training Centre	Date: 8/12/16
Client: Fire and Rescue NSW	Sampler: T. Nham
Site: 2-16 Mann Street, Armidale, NSW	
Well Condition (i.e road box, locked etc): Roadbox	Purge Method: Micropurge
Depth to Water Table Pre-purge (from TOC): 13.985	Sample Method: "
Depth of PSH (from TOC): —	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 16.41	Well Diameter: 50mm
Casing Stickup: —	Calculated Bore Volume(L): —
Depth to Water Table Post - purge (from TOC): 14.09	QA Collected: ~~NA~~ QA102

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
9:51	1	14.07	6.07	1622	6.75	76.5	19.5	Brown cloudy
9:56	2	14.08	5.37	1631	6.54	81.0	19.4	"
9:59	3	14.08	5.28	1609	6.41	82.4	18.8	"
10:05	4	14.09	5.22	1609	6.28	84.6	18.7	"
10:10	5	14.09	4.88	1625	6.20	87.3	18.3	"
10:15	6	14.09	4.90	1627	6.16	87.9	19.1	"
10:19	7	14.08	4.99	1608	6.14	87.0	18.7	"
10:24	8	14.09	4.80	1610	6.11	89.2	18.7	"
Post Sample Parameters								

Number of Bottles: 6

Comments: Metals Filtered

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	**Borehole ID** MW02
Project Number: 21-25583-04	
Project Name: Armidale Training Centre	**Sample ID:** 〃
Client: Fire and Rescue NSW	**Date:** 8/12/2016
Site: 2-16 Mann Street, Armidale, NSW	**Sampler:** T. Nham
Well Condition (i.e road box, locked etc): Roadbox	**Purge Method:** Micropurge
Depth to Water Table Pre-purge (from TOC): 14.732	**Sample Method:** 〃
Depth of PSH (from TOC): —	**Casing Type:** uPVC
Depth to Bottom of Casing (BOC) from TOC: 17.79	**Well Diameter:** 50mm
Casing Stickup: —	**Calculated Bore Volume(L):** —
Depth to Water Table Post - purge (from TOC): 15.75	**QA Collected:** [illegible] —

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
8:41	1	15.04	1.62	1219	7.58	75.6	18.2	brown cloudy
8:43	2	15.12	1.24	1213	7.35	76.2	18.1	〃
8:46	3	15.26	0.67	1198	6.81	82.9	18.1	〃
8:50	4	15.39	0.58	1192	6.42	92.2	18.0	〃
8:55	5	15.53	1.19	1185	6.23	91.9	18.0	〃
8:59	6	15.61	1.66	1178	6.19	89.4	18.1	〃
9:01	7	15.68	1.87	1177	6.18	88.2	18.2	〃
9:04	8	15.71	1.97	1178	6.14	89.5	18.2	〃
Post Sample Parameters								

Number of Bottles: 6

Comments: Metals filtered.

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW03
Project Number: **21-25583-04**	
Project Name: **Armidale Training Centre**	Sample ID: "
Client: **Fire and Rescue NSW**	Date: 8/12/16
Site: **2-16 Mann Street, Armidale, NSW**	Sampler: **T. Nham**
Well Condition (i.e road box, locked etc): Roadbox	Purge Method: Micropurge
Depth to Water Table Pre-purge (from TOC): 12.515	Sample Method: "
Depth of PSH (from TOC): —	Casing Type: uPVC class 18
Depth to Bottom of Casing (BOC) from TOC: 18.03	Well Diameter: 50mm
Casing Stickup: —	Calculated Bore Volume(L): —
Depth to Water Table Post - purge (from TOC): 14.80	QA Collected: —

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (^{0}C)	Comments
11:07	1	12.78	1.83	1429	6.85	76.7	18.7	Clear/cloudy
11:10	2	13.27	1.51	1416	6.76	68.2	18.4	"
11:12	3	13.62	1.50	1410	6.79	57.3	18.4	"
11:16	4	13.79	1.59	1411	6.81	51.2	18.5	"
11:20	5	14.07	1.86	1412	6.82	48.4	18.5	"
11:24	6	14.34	1.80	1416	6.80	46.9	18.5	"
11:28	7	14.62	1.85	1414	6.78	45.4	18.4	"
Post Sample Parameters								

Number of Bottles: 6

Comments: Metals filtered

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW04
Project Number: **21-25583-04**	
Project Name: **Armidale Training Centre**	Sample ID: "
Client: **Fire and Rescue NSW**	Date: 8/12/16
Site: **2-16 Mann Street, Armidale, NSW**	Sampler: **T. Nham**
Well Condition (i.e road box, locked etc): Monument	Purge Method: Micropurge
Depth to Water Table Pre-purge (from TOC): 12.802	Sample Method: "
Depth of PSH (from TOC): —	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 18.74	Well Diameter: 50mm
Casing Stickup: 0.73	Calculated Bore Volume(L): —
Depth to Water Table Post - purge (from TOC): 12.91	QA Collected: —

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
12:09	1	12.91	3.00	817	7.03	87.7	17.6	Brown cloudy
12:12	2	12.91	2.74	800	6.72	79.5	17.3	"
12:16	3	12.91	2.34	794	6.68	75.2	17.3	"
12:18	4	12.91	2.11	784	6.62	60.6	17.3	"
12:20	5	12.91	2.02	781	6.56	52.6	17.3	"
12:22	6	12.91	2.20	778	6.57	49.7	17.1	"
12:24	7	12.91	2.13	775	6.57	44.8	17.1	"
Post Sample Parameters								

Number of Bottles: 6

Comments: Metals Filtered

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

Appendix D – Borehole Logs

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB01

Page 1 of

Client Fire & Rescue NSW	**Drill Co.** BG Drilling	**Easting**
Project Armidale FRNSW Site Investigation	**Driller** Randall Smith	**Northing**
Project No. 212558304	**Rig Type** Hanjin D&B 8-D	**Grid Ref** GDA94_MGA_zone_56
Site Armidale FRNSW	**Drill Method** SFA	**Elevation**
Location 2-16 Mann Street, Armidale, NSW	**Total Depth (m)** 3.5	**Logged By** Terry Nham
Date Drilled 30/11/2016 - 30/11/2016	**Diameter (mm)** 125	**Checked By**

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)
	SFA	0.3	SB01_0.0-0.1			gravelly SAND, fine, poorly graded, subangular, pale brown, some medium to coarse gravel (FILL)	D	MD		
0.2						CLAY, medium to high plasticity, dark brown (NATURAL - SOIL)	M	F		-0.2
0.4		0.2	SB01_0.5-0.6 (QA02)							-0.4
0.6										-0.6
0.8		0.1	SB01_0.9-1.0							-0.8
1										-1
1.2										-1.2
1.4										-1.4
1.6						gravelly CLAY, low plasticity, grey and brown, some medium to coarse gravel (NATURAL - SOIL)	SM	ST		-1.6
1.8		0	SB01_1.9-2.0							-1.8
2										-2
2.2										-2.2
2.4						gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	VD		-2.4
2.6										-2.6
2.8		0	SB01_2.9-3.0							-2.8
3										-3
3.2										-3.2
3.4		0.1	SB01_3.4-3.5							-3.4
3.6						Termination Depth at:3.50 m. Refusal on bedrock.				-3.6

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB02

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 30/11/2016 - 30/11/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA
Total Depth (m) 4
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By

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)
	SFA	0.1	SB02_0.0-0.1			gravelly SAND, fine, pale brown, some medium to coarse gravel (FILL)	D	MD		
						CLAY, medium to high plasticity, olive- brown (NATURAL - SOIL)	M	F		
0.5		0	SB02_0.5-0.6							-0.5
		0.1	SB02_0.9-1.0							
1										-1
1.5						gravelly SAND, fine, poorly graded, orange- brown, some fine gravel (NATURAL - SOIL)	SM	MD		-1.5
		0	SB02_1.9-2.0							
2										-2
2.5										-2.5
		0	SB02_2.9-3.0							
3						gravelly SAND, fine to medium, poorly graded, brown, some medium to coarse gravel (NATURAL - SOIL)	D	D		-3
3.5										-3.5
		0.1	SB02_3.9-4.0							
4						Termination Depth at:4.00 m. Refusal on bedrock.				-4
4.5										-4.5
5										-5
5.5										-5.5
6										-6
6.5										-6.5
7										-7
7.5										-7.5
8										-8
8.5										-8.5
9										-9
9.5										-9.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB03

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 30/11/2016 - 30/11/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA
Total Depth (m) 2.5
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By

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)
	SFA					ASPHALT				
0.1						gravelly CLAY, low plasticity, grey, some fine to medium gravel (FILL)	SM	F		-0.1
0.2										-0.2
0.3										-0.3
0.4		0.3	SB03_0.4-0.5							-0.4
0.5										-0.5
0.6										-0.6
0.7						gravelly CLAY, low to medium plasticity, brown and grey, some fine to medium gravel (NATURAL - SOIL)	M	F		-0.7
0.8										-0.8
0.9		0.2	SB03_0.9-1.0							-0.9
1										-1
1.1										-1.1
1.2										-1.2
1.3										-1.3
1.4										-1.4
1.5										-1.5
1.6										-1.6
1.7										-1.7
1.8						gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	D		-1.8
1.9		0	SB03_1.9-2.0							-1.9
2										-2
2.1										-2.1
2.2										-2.2
2.3										-2.3
2.4		0.1	SB03_2.4-2.5							-2.4
2.5						Termination Depth at:2.50 m. Refusal on bedrock.				-2.5
2.6										-2.6

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

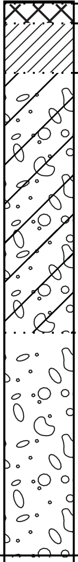
BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB04

Page 1 of

Client Fire & Rescue NSW	**Drill Co.** BG Drilling	**Easting**
Project Armidale FRNSW Site Investigation	**Driller** Randall Smith	**Northing**
Project No. 212558304	**Rig Type** Hanjin D&B 8-D	**Grid Ref** GDA94_MGA_zone_56
Site Armidale FRNSW	**Drill Method** SFA	**Elevation**
Location 2-16 Mann Street, Armidale, NSW	**Total Depth (m)** 4.5	**Logged By** Terry Nham
Date Drilled 30/11/2016 - 30/11/2016	**Diameter (mm)** 125	**Checked By**

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)
	SFA					ASPHALT	SM	MD		
0.5		0.8	SB04_0.4-0.5			GRAVEL, coarse, poorly graded, angular, dark grey to black (FILL)	M	S		-0.5
1		0.3	SB04_0.9-1.0			sandy CLAY, medium to high plasticity, dark brown and black, some fine to medium sand (NATURAL - SOIL)	SM	ST		-1
1.5						gravelly CLAY, low to medium plasticity, dark brown and grey, some medium to coarse gravel (NATURAL - SOIL)				-1.5
2		0.2	SB04_1.9-2.0							-2
2.5										-2.5
3		0	SB04_2.9-3.0			gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	D		-3
3.5										-3.5
4		0	SB04_3.9-4.0							-4
4.5		0.1	SB04_4.4-4.5							-4.5
						Termination Depth at:4.50 m. Refusal on bedrock.				
5										-5
5.5										-5.5
6										-6
6.5										-6.5
7										-7
7.5										-7.5
8										-8
8.5										-8.5
9										-9
9.5										-9.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB05

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 01/12/2016 - 01/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA
Total Depth (m) 5
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By

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)
	SFA	0	SB05_0.0-0.1			gravelly SAND, fine to medium, poorly graded, angular, grey, some medium to coarse gravel (FILL)	D	MD		
0.5		0	SB05_0.4-0.5			gravelly CLAY, low plasticity, brown, some fine to medium gravel (NATURAL - SOIL)	SM	ST		-0.5
1		0.1	SB05_0.9-1.0							-1
1.5										-1.5
2		0	SB05_1.9-2,0			gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	D		-2
2.5										-2.5
3		0.1	SB05_2.9-3,0							-3
3.5										-3.5
4		0.1	SB05_3.9-4.0							-4
4.5										-4.5
		0.1	SB05_4.9-5.0 (QA05)							
5						Termination Depth at:5.00 m. Target depth achieved.				-5
5.5										-5.5
6										-6
6.5										-6.5
7										-7
7.5										-7.5
8										-8
8.5										-8.5
9										-9
9.5										-9.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

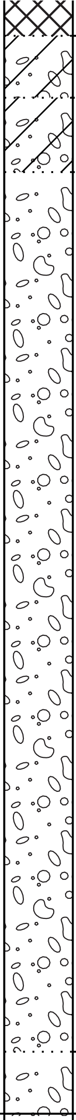
SOIL BORE SB06

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 01/12/2016 - 01/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA
Total Depth (m) 9
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By



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)
	SFA	0	SB06_0.0-0.1			sandy GRAVEL, fine to coarse, poorly graded, angular, grey, some fine sand (FILL)	D	MD		
0.5		0	SB06_0.4-0.5 (QA04)			gravelly CLAY, low to medium plasticity, brown, some fine to medium gravel (NATURAL - SOIL)	SM	F		-0.5
1		0	SB06_0.9-1.0			gravelly CLAY, low plasticity, brown, some fine to medium gravel (NATURAL - SOIL)	D	ST		-1
1.5						gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine gravel (NATURAL - SOIL)	D	D		-1.5
2		0	SB06_1.9-2.0							-2
2.5										-2.5
3		0	SB06_2.9-3.0							-3
3.5										-3.5
4		0	SB06_3.9-4.0							-4
4.5										-4.5
5		0	SB06_4.9-5.0							-5
5.5										-5.5
6		0	SB06_5.9-6.0							-6
6.5										-6.5
7		0	SB06_6.9-7.0							-7
7.5										-7.5
8		0	SB06_7.9-8.0							-8
8.5						gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	VD		-8.5
9		0.1	SB06_8.9-9.0							-9
						Termination Depth at:9.00 m. Target depth achieved.				
9.5										-9.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB07

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 01/12/2016 - 01/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA
Total Depth (m) 1.7
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By

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)
	SFA	0	SB07_0.0-0.1		▩	gravelly SAND, fine, poorly graded, subangular, pale brown and grey, with coarse gravel (FILL)	D	MD		
0.1										-0.1
0.2										-0.2
0.3					▨	gravelly CLAY, low plasticity, brown, some fine to medium gravel (NATURAL - SOIL)	SM	ST		-0.3
0.4		0	SB07_0.4-0.5							-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8										-0.8
0.9		0	SB07_0.9-1.0							-0.9
1										-1
1.1										-1.1
1.2										-1.2
1.3										-1.3
1.4					░	gravelly SAND, fine, poorly graded, subangular, orange- brown, some medium to coarse gravel (NATURAL - SOIL)	D	MD		-1.4
1.5										-1.5
1.6		0	SB07_1.6-1.7							-1.6
1.7						Termination Depth at:1.70 m. Refusal on bedrock.				-1.7

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB08

Client Fire & Rescue NSW	**Drill Co.** BG Drilling	**Easting**
Project Armidale FRNSW Site Investigation	**Driller** Randall Smith	**Northing**
Project No. 212558304	**Rig Type** Hanjin D&B 8-D	**Grid Ref** GDA94_MGA_zone_56
Site Armidale FRNSW	**Drill Method** SFA	**Elevation**
Location 2-16 Mann Street, Armidale, NSW	**Total Depth (m)** 5	**Logged By** Terry Nham
Date Drilled 01/12/2016 - 01/12/2016	**Diameter (mm)** 125	**Checked By**

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)
	SFA					CONCRETE				
0.5		0	SB08_0.4-0.5			gravelly CLAY, medium to high plasticity, olive- brown, some fine to medium gravel (NATURAL - SOIL)	M	S		-0.5
1		0	SB08_0.9-1.0			gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	MD		-1
1.5										-1.5
2		0	SB08_1.9-2.0							-2
2.5										-2.5
3		0	SB08_2.9-3.0							-3
3.5										-3.5
4		0	SB08_3.9-4.0							-4
4.5						gravelly SAND, fine, poorly graded, subangular, orange- brown, some coarse gravel (NATURAL - SOIL)	D	VD		-4.5
5		0	SB08_4.9-5.0							-5
						Termination Depth at:5.00 m. Target depth achieved.				
5.5										-5.5
6										-6
6.5										-6.5
7										-7
7.5										-7.5
8										-8
8.5										-8.5
9										-9
9.5										-9.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

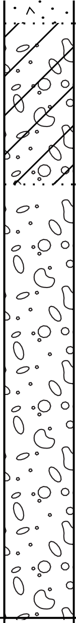
SOIL BORE SB09

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 01/12/2016 - 01/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA
Total Depth (m) 5
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By



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)
	SFA					CONCRETE				
0.5		0	SB09_0.4-0.5			gravelly CLAY, low to medium plasticity, brown, some fine to medium gravel (NATURAL - SOIL)	M	S		-0.5
1		0	SB09_0.9-1.0 (QA06)							-1
1.5						gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	D		-1.5
2			SB09_1.9-2.0							-2
2.5										-2.5
3		0	SB09_2.9-3.0							-3
3.5										-3.5
4		0	SB09_3.9-4,0							-4
4.5										-4.5
5		0.1	SB09_4.9-5.0			Termination Depth at:5.00 m. Target depth achieved.				-5
5.5										-5.5
6										-6
6.5										-6.5
7										-7
7.5										-7.5
8										-8
8.5										-8.5
9										-9
9.5										-9.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB10

Page 1 of

Client Fire & Rescue NSW	**Drill Co.** BG Drilling	**Easting**
Project Armidale FRNSW Site Investigation	**Driller** Randall Smith	**Northing**
Project No. 212558304	**Rig Type** Hanjin D&B 8-D	**Grid Ref** GDA94_MGA_zone_56
Site Armidale FRNSW	**Drill Method** HA	**Elevation**
Location 2-16 Mann Street, Armidale, NSW	**Total Depth (m)** 1.3	**Logged By** Terry Nham
Date Drilled 08/12/2016 - 08/12/2016	**Diameter (mm)** 125	**Checked By**

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)
	HA	0	SB10_0.0-0.1		▩	gravelly CLAY, low plasticity, dark brown, some medium to coarse gravel (FILL)	SM	VST		
0.1										-0.1
0.2										-0.2
0.3		0	SB10_0.3-0.4							-0.3
0.4					▨	silty CLAY, low plasticity, pale brown, some sandy silt (NATURAL - SOIL)	D	VST		-0.4
0.5										-0.5
0.6		0	SB10_0.6-0.7							-0.6
0.7					▨	sandy CLAY, low plasticity, brown, some fine to medium sand (NATURAL - SOIL)	SM	ST		-0.7
0.8										-0.8
0.9										-0.9
1										-1
1.1										-1.1
1.2		0	SB10_1.2-1.3							-1.2
1.3						Termination Depth at:1.30 m. Target depth achieved.				-1.3

Notes

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

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB11

Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 09/12/2016 - 09/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method HA
Total Depth (m) 1.3
Diameter (mm) 125

Easting
Northing
Grid Ref GDA94_MGA_zone_56
Elevation
Logged By Terry Nham
Checked By

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)
	HA	0	SB11_0.0-0.1			sandy CLAY, low plasticity, pale brown, some fine sand (FILL)	D	VST		
0.1						gravelly CLAY, low plasticity, brown, some fine to coarse gravel (FILL)	D	VST		-0.1
0.2		0	SB11_0.2-0.3							-0.2
0.3		0	SB11_0.3-0.4			CLAY, low plasticity, dark grey (FILL)	SM	VST		-0.3
0.4										-0.4
0.5		0	SB11_0.5-0.6			sandy CLAY, low plasticity, pale brown, some fine to medium sand (NATURAL - SOIL)	D	ST		-0.5
0.6										-0.6
0.7		0	SB11_0.7-0.8			CLAY, low to medium plasticity, orange- brown and grey, trace fine gravel (NATURAL - SOIL)	SM	ST		-0.7
0.8										-0.8
0.9										-0.9
1										-1
1.1										-1.1
1.2		0	SB11_1.2-1.3							-1.2
1.3						Termination Depth at:1.30 m. Target depth achieved.				-1.3

Notes

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

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SB12

Page 1 of

Client Fire & Rescue NSW	**Drill Co.** BG Drilling	**Easting**
Project Armidale FRNSW Site Investigation	**Driller** Randall Smith	**Northing**
Project No. 212558304	**Rig Type** Hanjin D&B 8-D	**Grid Ref** GDA94_MGA_zone_56
Site Armidale FRNSW	**Drill Method** HA	**Elevation**
Location 2-16 Mann Street, Armidale, NSW	**Total Depth (m)** 1.3	**Logged By** Terry Nham
Date Drilled 09/12/2016 - 09/12/2016	**Diameter (mm)** 125	**Checked By**

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)
	HA	0	SB12_0.0-0.1			gravelly CLAY, low plasticity, pale orange- brown, some medium to coarse gravel (FILL)	D	H		
0.1										-0.1
0.2		0	SB12_0.2-0.3			CLAY, low plasticity, dark grey, trace fine to medium gravel (FILL)	SM	VST		-0.2
0.3										-0.3
0.4										-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8		0	SB12_0.8-0.9							-0.8
0.9										-0.9
1										-1
1.1										-1.1
1.2		0	SB12_1.2-1.3							-1.2
1.3						Termination Depth at:1.30 m. Target depth achieved.				-1.3

Notes

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

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW01

Page 1 of

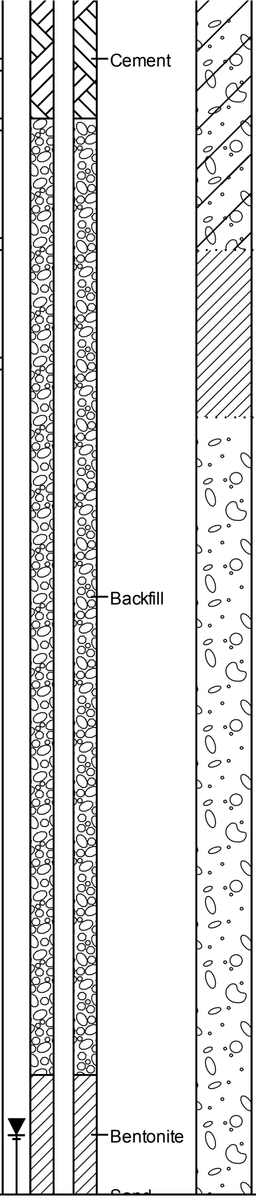
Client Fire & Rescue NSW	**Drill Co.** BG Drilling	**Easting, Northing** 373885.48, 6622074.289
Project Armidale FRNSW Site Investigation	**Driller** Randall Smith	**Grid Ref** GDA94_MGA_zone_56
Project No. 212558304	**Rig Type** Hanjin D&B 8-D	**Elevation** 983.777
Site Armidale FRNSW	**Drill Method** SFA & AH	**Collar RL** 983.876
Location 2-16 Mann Street, Armidale, NSW	**Total Depth (m)** 16.5	**Logged By** Terry Nham
Date Drilled 29/11/2016 - 29/11/2016	**Diameter (mm)** 125	**Checked By**

B.C.L No. N/A **Casing** PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	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.
0	SFA				Cement	gravelly CLAY, low plasticity, brown, some medium sand (NATURAL - SOIL)	SM	ST	
0.5		15.1	MW01_0.5-0.6						
1		11.4	MW01_1.0-1.1		Backfill				
2		2.3	MW01_2.0-2.1						
2.1						sandy CLAY, low plasticity, orange-brown, some fine gravel (NATURAL - SOIL)	D	VST	
3		2.6	MW01_3.0-3.1						
3.5	AH					gravelly SAND, fine to coarse, poorly graded, angular, brown and grey (NATURAL - BEDROCK)	D	H	
9					Bentonite				
9.6				▼					
10					Sand				

Depth (m): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10

Elevation (m): 983.5, 983, 982.5, 982, 981.5, 981, 980.5, 980, 979.5, 979, 978.5, 978, 977.5, 977, 976.5, 976, 975.5, 975, 974.5, 974



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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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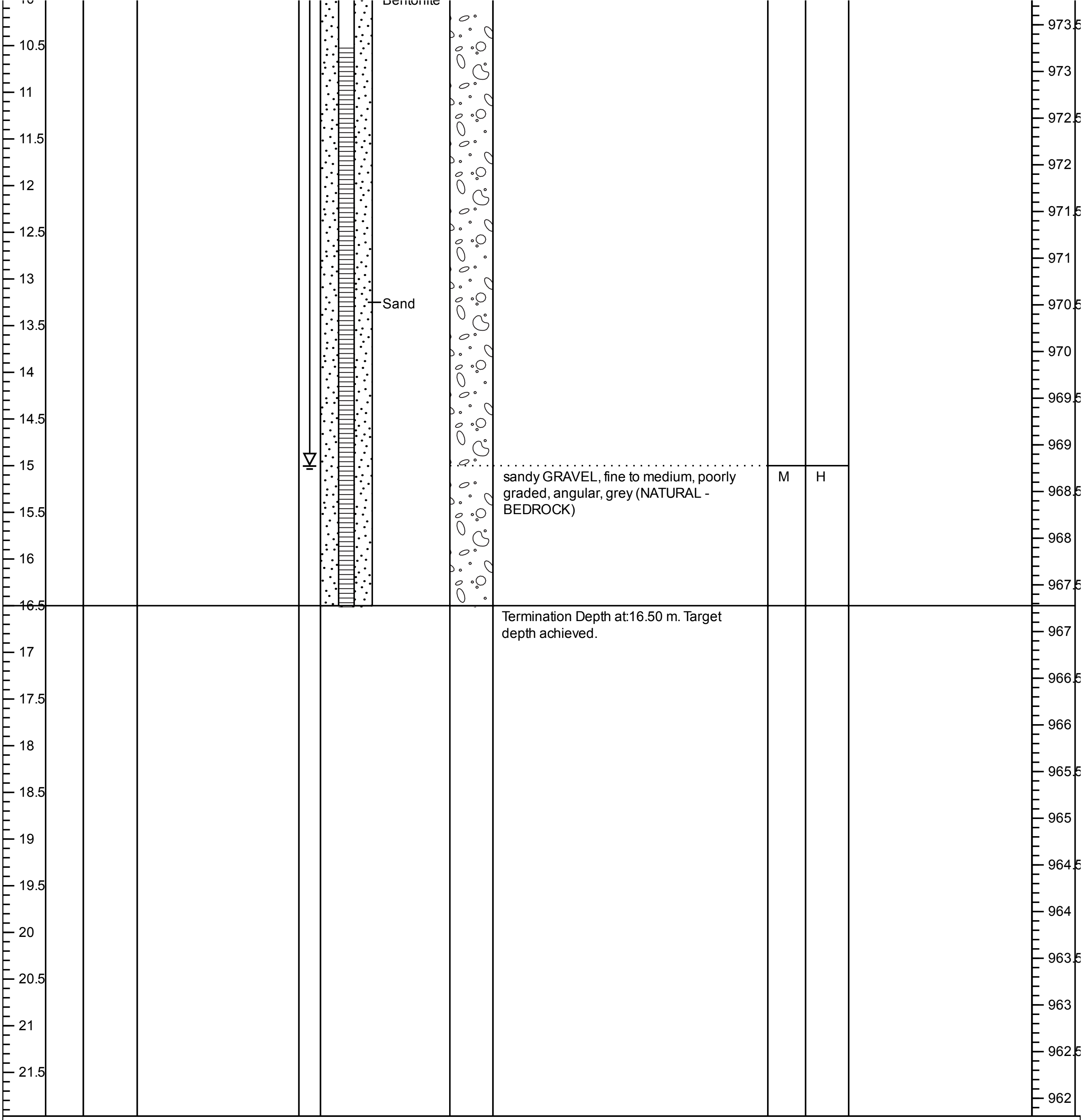
BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW01



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)
15							sandy GRAVEL, fine to medium, poorly graded, angular, grey (NATURAL - BEDROCK)	M	H		
16.5							Termination Depth at:16.50 m. Target depth achieved.				

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW02

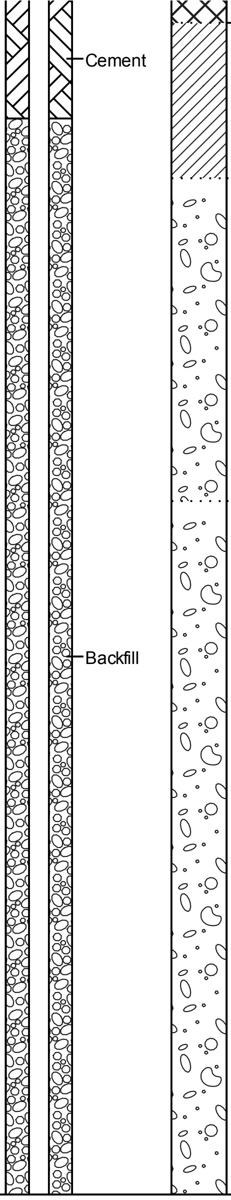
Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 01/12/2016 - 01/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA & AH
Total Depth (m) 18
Diameter (mm) 125

Easting, Northing 373964.491, 6621966.098
Grid Ref GDA94_MGA_zone_56
Elevation 985.425
Collar RL 985.469
Logged By Terry Nham
Checked By

B.C.L No. N/A
Casing PVC (Class 18)
Screen 0.5mm Slotted PVC (Class 18)
Surface Completion Gatic



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)
	SFA	0.1	MW02_0.0-0.1				sandy GRAVEL, coarse, poorly graded, angular, pale brown, some fine sand (FILL)	D	L		
		0.1	MW02_0.4-0.5				sandy CLAY, low to medium plasticity, brown, some fine sand (NATURAL - SOIL)	SM	F		
0.5					Cement						985
		0.1	MW02_0.9-1.0								
1											984.5
1.5							gravelly SAND, fine, poorly graded, orange- brown, some medium to coarse gravel (NATURAL - SOIL)	D	D		984
		0.1	MW02_1.9-2.0								
2											983.5
2.5											983
		0.1	MW02_2.9-3.0								
3											982.5
3.5											982
		0.1	MW02_3.9-4.0								
4											981.5
	AH						sandy GRAVEL, fine to coarse, poorly graded, subangular, grey to dark grey, some fine sand (NATURAL - BEDROCK)	D	H		
4.5											981
5											980.5
5.5					Backfill						980
6											979.5
6.5											979
7											978.5
7.5											978
8			MW02_8.0-9.0								977.5
8.5											977
9											976.5
9.5											976
10											975.5

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

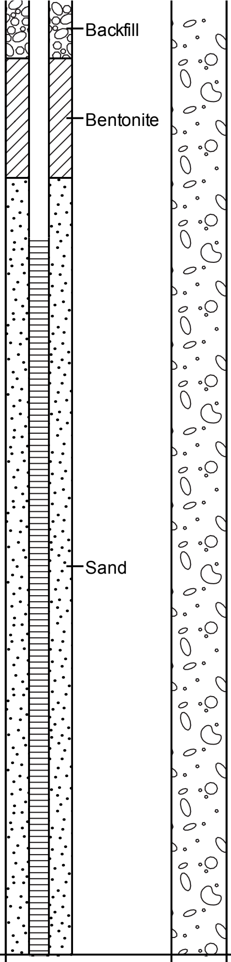
produced by ESlog.ESdat.net on 27 Apr 2017

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW02

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)
10.5											975
11			MW02_11.0-12.0								974.5
11.5											974
12											973.5
12.5											973
13											972.5
13.5											972
14			MW02_14.0-15.0								971.5
14.5											971
15											970.5
15.5											970
16											969.5
16.5											969
17			MW02_17.0-18.0								968.5
17.5											968
18							Termination Depth at:18.00 m. Target depth achieved.				967.5
18.5											967
19											966.5
19.5											966
20											965.5
20.5											965
21											964.5
21.5											964



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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW03

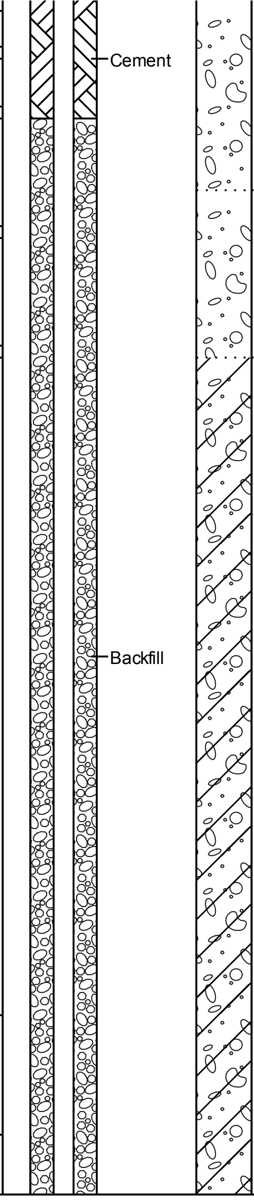
Page 1 of

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 30/11/2016 - 30/11/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA & AH
Total Depth (m) 18
Diameter (mm) 125

Easting, Northing 373922.11, 6622107.76
Grid Ref GDA94_MGA_zone_56
Elevation 982.371
Collar RL 982.44
Logged By Terry Nham
Checked By

B.C.L No. N/A
Casing PVC (Class 18)
Screen 0.5mm Slotted PVC (Class 18)
Surface Completion Gatic



Depth (m): 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10

Elevation (m): 982, 981.5, 981, 980.5, 980, 979.5, 979, 978.5, 978, 977.5, 977, 976.5, 976, 975.5, 975, 974.5, 974, 973.5, 973, 972.5

Drilling Method	PID (ppm)	Sample ID	Well Details	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.
SFA	0.1	MW03_0.0-0.1	Cement	gravelly SAND, fine, poorly graded, subangular, pale brown and orange, some medium to coarse gravel (NATURAL - SOIL)	D	MD	
	0	MW03_0.4-0.5					
	0	MW03_0.9-1.0					
			Backfill	gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine gravel (NATURAL - SOIL)	D	D	
	0	MW03_1.9-2.0					
AH	0.1	MW03_2.9-3.0					
				clayey GRAVEL, medium to coarse, poorly graded, angular, grey (NATURAL - BEDROCK)	D	H	
		MW03_8.5-9.5					

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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

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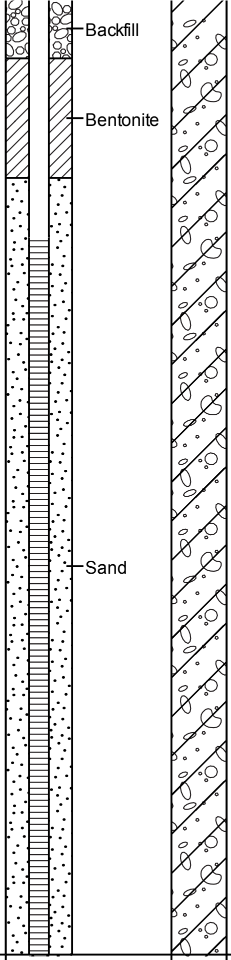

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
10.5					Backfill						972
11			MW03_11.0-12.0		Bentonite						971.5
11.5											971
12											970.5
12.5											970
13											969.5
13.5											969
14			MW03_14.0-15.0								968.5
14.5					Sand						968
15											967.5
15.5											967
16											966.5
16.5											966
17			MW03_17.0-18.0								965.5
17.5											965
18							Termination Depth at:18.00 m. Target depth achieved.				964.5
18.5											964
19											963.5
19.5											963
20											962.5
20.5											962
21											961.5
21.5											961
											960.5

Notes

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Drilling Abbreviations	**Moisture Abbreviations**	**Consistency Abbreviations**	
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BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

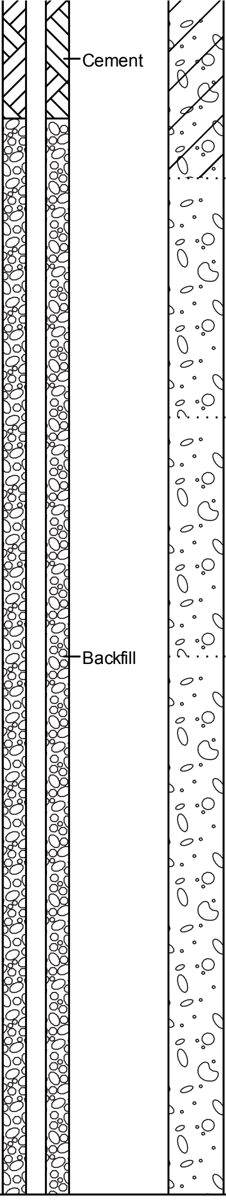
MONITORING WELL MW04

Client Fire & Rescue NSW
Project Armidale FRNSW Site Investigation
Project No. 212558304
Site Armidale FRNSW
Location 2-16 Mann Street, Armidale, NSW
Date Drilled 01/12/2016 - 01/12/2016

Drill Co. BG Drilling
Driller Randall Smith
Rig Type Hanjin D&B 8-D
Drill Method SFA & AH
Total Depth (m) 18
Diameter (mm) 125

Easting, Northing 373997.1, 6622089.366
Grid Ref GDA94_MGA_zone_56
Elevation 982.921
Collar RL 983.013
Logged By Terry Nham
Checked By

B.C.L No. N/A
Casing PVC (Class 18)
Screen 0.5mm Slotted PVC (Class 18)
Surface Completion Monument



Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	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)
	SFA	0.1	MW04_0.0-0.1			gravelly CLAY, low plasticity, brown, some fine to medium gravel (NATURAL - SOIL)	SM	F		
0.5		0.1	MW04_0.4-0.5		Cement					982.5
1		0.2	MW04_0.9-1.0							982
1.5						gravelly SAND, fine, poorly graded, subangular, orange- brown, some fine to medium gravel (NATURAL - SOIL)	D	MD		981.5
2										981
2.5										980.5
3		0.1	MW04_2.9-3.0							980
3.5						gravelly SAND, fine, poorly graded, angular, brown, some medium to coarse gravel (NATURAL - SOIL)	D	D		979.5
4		0.1	MW04_3.9-4.0							979
4.5										978.5
5		0.1	MW04_4.9-5.0							978
5.5	AH				Backfill	sandy GRAVEL, fine and coarse, poorly graded, angular, grey- brown, some fine sand (NATURAL - BEDROCK)	D	H		977.5
6										977
6.5										976.5
7										976
7.5										975.5
8			MW04_8.0-9.0							975
8.5										974.5
9										974
9.5										973.5
10										973

Notes

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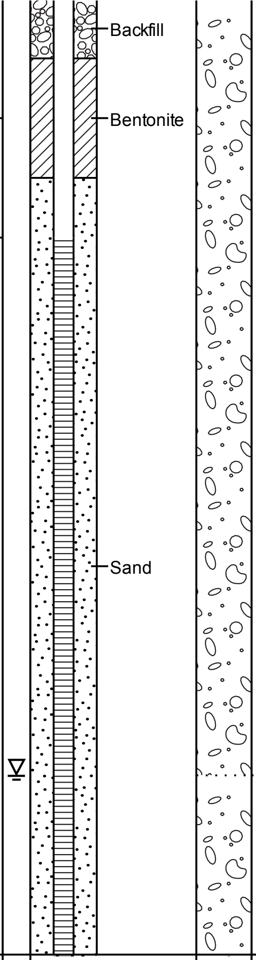
Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, 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	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER



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)
11			MW04_11.0-12.0								972
16.5				▽			sandy GRAVEL, fine to coarse, poorly graded, angular, grey to dark grey, some fine sand (NATURAL - BEDROCK)	M	H		
18							Termination Depth at:18.00 m. Target depth achieved.				965

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	
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Appendix E – NATA accredited laboratory reports and chain of custody documentation

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Poorak 095
Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 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
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCA Rose Gum Road Warabrook NSW 2304
Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: Sydney

PROJECT: 21-25583-04 Armidale

ORDER NUMBER:

PROJECT MANAGER: Ben Anderson

CONTACT PH: 02 9239 7170 / 0408 713 343

SAMPLER: Terry Nham

SAMPLER MOBILE: 0403 251 883

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to: ben.anderson@ghd.com terry.nham@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT: (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):

Page 1/10

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

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)	Frank ALS		
DATE/TIME: 2/12/16	DATE/TIME: 2-12-16 1745	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).					
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations
1	MW01_0.5-0.6	29/11/16	Soil		2	X			X		
(44)	MW01_1.0-1.1	↓	↓		2						
(45)	MW01_2.0-2.1				2						
2	MW01_3.0-3.1				2	X					
(46)	SB01_0-0.1	30/11/16			↓						
3	SB01_0.5-0.6	↓				X					
(47)	SB01_0.9-1.0										
(48)	SB01_1.9-2.0										
4	SB01_2.9-3.0					X					
(49)	SB01_3.4-3.5										
5	QA02					X					
(50)	SB02_0-0.1										
TOTAL											

Environmental Division
Sydney
Work Order Reference
ES1627710

Telephone : + 61-2-8784 8555

Forward WO
Analysis: EUROFNS: QA03+ QA01
By /
By
Courier
ES1627710
PO / In

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 Burma Road Poorak 095
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☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: Sydney
PROJECT: 21-25583-04 Armidale
ORDER NUMBER:
PROJECT MANAGER: Ben Anderson
CONTACT PH: 02 9239 7170 / 0408 713 343
SAMPLER: Terry Nham
SAMPLER MOBILE: 0403 251 883
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: ben.anderson@ghd.com terry.nham@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (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):

Page 2/10

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

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)	Frank ALS		
DATE/TIME: 2/12/16	DATE/TIME: 2-12-16 1745	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations										
(51)	SB02_0.5-0.6	30/11/16	Soil		2																
6	SB02_0.9-1.0					X		X	X												
(52)	SB02_1.9-2.0																				
(53)	SB02_2.9-3.0																				
7	SB02_3.9-4.0					X															
(54)	SB03_0.4-0.5																				
8	SB03_0.9-1.0					X		X	X												
(55)	SB03_1.9-2.0																				
(56)	SB03_2.4-2.5																				
[redacted]	QA03					Please send to Eurofins with attached COC.															
9	SB04_0.4-0.5					X															
(58)	SB04_0.9-1.0																				
				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.

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☐MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304
Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: Sydney
PROJECT: 21-25583-04 Armidale
ORDER NUMBER:
PROJECT MANAGER: Ben Anderson
CONTACT PH: 02 9239 7170 / 0408 713 343
SAMPLER: Terry Nham
SAMPLER MOBILE: 0403 251 883
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: ben.anderson@ghd.com terry.nham@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (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**):

Page 3/10

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

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:
Terry Nham (GHD)
DATE/TIME:
2/12/16

RECEIVED BY:
Frank ALS
DATE/TIME:
2-12-16 1745

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations										
(59)	SB04_1.9-2.0	30/11/16	Soil		2																
(60)	SB04_2.9-3.0	↓	↓		↓																
(61)	SB04_3.9-4.0																				
10	SB04_4.4-4.5					X															
(62)	MW03_0-0.1																				
(63)	MW03_0.4-0.5																				
11	MW03_0.9-1.0					X			X												
(64)	MW03_1.9-2.0																				
(65)	MW03_2.9-3.0																				
(66)	MW03_8.5-9.5																				
(67)	MW03_11.0-12.0																				
(68)	MW03_14.0-15.0																				
				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 Burma Road Poorak [illegible]095
Ph: 08 8359 0890 E: adelaide@alsglobal.com
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CLIENT: GHD Pty Ltd
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TURNAROUND REQUIREMENT ☐ 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):**

Page 4/10

ALS QUOTE NO.: EN/005/16

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OF: 1 2 3 4 5 6 7

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Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)	Frank ALS		
DATE/TIME: 2/12/16	DATE/TIME: 2-12-16 1745	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).														
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations									
12	MW03_17.0-18.0	30/11/16	Soil		2	X														
(69)	MW04_0-0.1	1/12/16	↓		↓															
(70)	MW04_0.4-0.5	↓	↓		↓															
(71)	MW04_0.9-1.0	↓	↓		↓															
13	MW04_1.9-2.0	↓	↓		↓	X			X											
(72)	MW04_2.9-3.0	↓	↓		↓															
(73)	MW04_3.9-4.0	↓	↓		↓															
(74)	MW04_4.9-5.0	↓	↓		↓															
(75)	MW04_8.0-9.0	↓	↓		↓															
(76)	MW04_11.0-12.0	↓	↓		↓															
(77)	MW04_14.0-15.0	↓	↓		↓															
14	MW04_17.0-18.0	↓	↓		↓	X														
				TOTAL																

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Page 5/10
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DATE/TIME: 2/12/16

RECEIVED BY: Frank ALS
DATE/TIME: 2-12-16 1745

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).															
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78	MW02_0-0.1	1/12/16	Soil		2																
79	MW02_0.4-0.5	↓	↓		↓																
15	MW02_0.9-1.0					X			X												
80	MW02_1.9-2.0																				
81	MW02_2.9-3.0																				
82	MW02_3.9-4.0																				
83	MW02_8.0-9.0																				
84	MW02_11.0-12.0																				
85	MW02_14.0-15.0																				
16	MW02_17.0-18.0					X															
86	SB07_0-0.1																				
17	SB07_0.4-0.5					X			X												
				TOTAL																	

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ALS

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

CLIENT: GHD Pty Ltd
OFFICE: Sydney
PROJECT: 21-25583-04 Armidale
ORDER NUMBER:
PROJECT MANAGER: Ben Anderson
CONTACT PH: 02 9239 7170 / 0408 713 343
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Page 6/10

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FOR LABORATORY USE ONLY (Circle)
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Other comment:

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Terry Nham (GHD)	Frank ALS		
DATE/TIME: 2/12/16	DATE/TIME: 2-12-16 1745	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).															
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(87)	SB07_0.9-1.0	1/12/16	Soil		2																
18	SD07_1.6-1.7					X															
(88)	SB06_0-0.1																				
19	SB06_0.4-0.5					X		X	X												
(89)	SB06_0.9-1.0																				
(90)	SB06_1.9-2.0																				
(91)	SB06_2.9-3.0																				
(92)	SB06_3.9-4.0																				
20	SB06_4.9-5.0					X															
(93)	SB06_5.9-6.0																				
(94)	SB06_6.9-7.0																				
(95)	SD06_7.9-8.0																				
				TOTAL																	

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CHAIN OF CUSTODY

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96	SB06_8.9-9.0	1/12/16	Soil		2																
	QA04					Please send to Eurofins with attached COC.															
97	SB05_0-0.1																				
21	SB05_0.4-0.5					X			X												
98	SB05_0.9-1.0																				
99	SB05_1.9-2.0																				
100	SB05_3.9-4.0																				
22	SB05_4.9-5.0					X															
101	QA05																				
23	SB08_0.4-0.5					X															
102	SB08_0.9-1.0																				
103	SB08_1.9-2.0																				
				TOTAL																	

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CONTACT PH: 02 9239 7170 / 0408 713 343

SAMPLER: Terry Nham

SAMPLER MOBILE: 0403 251 883

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to: ben.anderson@ghd.com terry.nham@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (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**):

Page 8/10

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

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:
Terry Nham (GHD)
DATE/TIME: 2/12/16

RECEIVED BY:
Frank ALS
DATE/TIME: 2-12-16 1745

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations										
(104)	SB08-2.9-3.0	1/12/16	Soil		2																
24	SB08_3.9-4.0					X															
(105)	SB08_4.9-5.0																				
(106)	SB09_0.4-0.5																				
25	SB09_0.9-1.0					X		X	X												
(107)	SB09_1.9-2.0																				
(108)	SB09_2.9-3.0																				
(109)	SB09_3.9-4.0																				
26	SB09_4.9-5.0					X															
27	QA06					X			X												
				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 Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 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
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304
Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: Sydney
PROJECT: 21-25583-04 Armidale
ORDER NUMBER:
PROJECT MANAGER: Ben Anderson
CONTACT PH: 02 9239 7170 / 0408 713 343
SAMPLER: Terry Nham
SAMPLER MOBILE: 0403 251 883
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: ben.anderson@ghd.com terry.nham@ghd.com
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TURNAROUND REQUIREMENT (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**):

Page 9/10

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

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: Terry Nham (GHD)
DATE/TIME: 2/12/16

RECEIVED BY: Frank ALS
DATE/TIME: 2-12-16 1745

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).																
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations											
28	SS01	28/11/16	Soil		2	X		X	X													
29	SS02	↓	↓		↓	X																
30	SS03					X																
31	SS04					X		X	X													
32	SS05					X		X	X													
33	SS06					X			X													
34	SS09					X		X	X													
35	QA01					X			X													
36	SS07	1/12/16				X		X	X													
37	SS08	↓				X			X													
					TOTAL																	

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☐ADELAIDE 21 Burma Road Poorak 095
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Ph: 07 7471 5600 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
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

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☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

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Page 10/10

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Other comment:

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DATE/TIME: 2/12/16

RECEIVED BY: Frank ALS
DATE/TIME: 2-12-16 1745.

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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).						
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations	
38	SW01	28/11/16	Water		6	X			X	X	X	
39	SW02	↓	↓		6	X			X	X	X	
40	QA101	↓			6	X			X			
41	SW03	1/12/16	↓		6	X			X	X	X	
(110)	SB04_Asphalt_0-0.04	30/11/16	Material		1							
42	SB03_Asphalt_0-0.08	↓			1	X						Crush and sample to analysis
(111)	SB08_Concrete_0-0.2	1/12/16			1							
43	SB09_Concrete_0-0.2	↓	↓		1	X						Crush only to 10cm then sample for analysis.
				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
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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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1627710**	Page	: 1 of 50
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	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 07 5413 8161	Telephone	: +61-2-8784 8555
Project	: 21-25583-04 Armidale	Date Samples Received	: 02-Dec-2016 17:45
Order number	: ----	Date Analysis Commenced	: 05-Dec-2016
C-O-C number	: ----	Issue Date	: 21-Dec-2016 09:52
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 112		
No. of samples analysed	: 43		

ilac-MRA NATA

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Lana Nguyen	Senior LCMS Chemist	Sydney Inorganics, 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.

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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	**MW1_0.5-0.6**	**MW1_3.0-3.1**	**SB01_0.5-0.6**	**SB01_2.9-3.0**	**QA02**
			Client sampling date / time	29-Nov-2016 00:00	29-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-001**	**ES1627710-002**	**ES1627710-003**	**ES1627710-004**	**ES1627710-005**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**5.8**	**13.5**	**12.0**	**8.6**	**13.6**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	----	----	----	----	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	----	----
Iron	7439-89-6	50	mg/kg	----	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**13**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**9**	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**14**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW1_0.5-0.6**	**MW1_3.0-3.1**	**SB01_0.5-0.6**	**SB01_2.9-3.0**	**QA02**
			Client sampling date / time	29-Nov-2016 00:00	29-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-001**	**ES1627710-002**	**ES1627710-003**	**ES1627710-004**	**ES1627710-005**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0003**	<0.0002	**0.0011**	**0.0002**	**0.0010**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW1_0.5-0.6**	**MW1_3.0-3.1**	**SB01_0.5-0.6**	**SB01_2.9-3.0**	**QA02**
			Client sampling date / time	29-Nov-2016 00:00	29-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-001**	**ES1627710-002**	**ES1627710-003**	**ES1627710-004**	**ES1627710-005**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0004**	<0.0002	**0.0019**	**0.0003**	**0.0016**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0048**	<0.0002	**0.0169**	**0.0012**	**0.0164**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	**0.0034**	<0.0002	**0.0040**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0054**	**0.0002**	**0.0647**	**0.0060**	**0.0820**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.0003**	<0.0002	**0.0014**	<0.0002	**0.0024**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0014**	<0.0002	**0.0049**	**0.0005**	**0.0048**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0004**	<0.0002	**0.0010**	<0.0002	**0.0010**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0002**	<0.0002	**0.0026**	<0.0002	**0.0030**
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW1_0.5-0.6**	**MW1_3.0-3.1**	**SB01_0.5-0.6**	**SB01_2.9-3.0**	**QA02**
			Client sampling date / time	29-Nov-2016 00:00	29-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-001**	**ES1627710-002**	**ES1627710-003**	**ES1627710-004**	**ES1627710-005**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0132**	**0.0002**	**0.0979**	**0.0082**	**0.116**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0102**	**0.0002**	**0.0816**	**0.0072**	**0.0984**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0128**	**0.0002**	**0.0926**	**0.0079**	**0.111**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**84.1**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**95.2**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**103**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**108**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**113**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**94.5**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**92.1**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**101**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**105**	----	----	----	----
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**MW1_0.5-0.6**	**MW1_3.0-3.1**	**SB01_0.5-0.6**	**SB01_2.9-3.0**	**QA02**
			Client sampling date / time	29-Nov-2016 00:00	29-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-001**	**ES1627710-002**	**ES1627710-003**	**ES1627710-004**	**ES1627710-005**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**110**	**109**	**110**	**113**	**97.2**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB02_0.9-1.0**	**SB02_3.9-4.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB04_4.4-4.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-006**	**ES1627710-007**	**ES1627710-008**	**ES1627710-009**	**ES1627710-010**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**21.0**	**8.9**	**17.1**	**15.6**	**6.5**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	**18600**	----	**13000**	----	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	**990**	----	**390**	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**12600**	----	**11900**	----	----
Iron	7439-89-6	50	mg/kg	**18100**	----	**46900**	----	----
Arsenic	7440-38-2	5	mg/kg	<5	----	**6**	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	----	----
Chromium	7440-47-3	2	mg/kg	**14**	----	**32**	----	----
Copper	7440-50-8	5	mg/kg	**8**	----	**11**	----	----
Lead	7439-92-1	5	mg/kg	**10**	----	**20**	----	----
Nickel	7440-02-0	2	mg/kg	**7**	----	**12**	----	----
Zinc	7440-66-6	5	mg/kg	**10**	----	**8**	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	<0.1	----	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	<0.5	----	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB02_0.9-1.0**	**SB02_3.9-4.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB04_4.4-4.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-006**	**ES1627710-007**	**ES1627710-008**	**ES1627710-009**	**ES1627710-010**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	----	<0.5	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	----	<0.5	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	----	**0.6**	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	----	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	<100	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	----	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	<50	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	<0.2	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0027**	<0.0002	<0.0002	**0.0040**	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB02_0.9-1.0**	**SB02_3.9-4.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB04_4.4-4.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-006**	**ES1627710-007**	**ES1627710-008**	**ES1627710-009**	**ES1627710-010**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0040**	**0.0002**	<0.0002	**0.0040**	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0470**	**0.0013**	<0.0002	**0.0287**	**0.0003**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0037**	<0.0002	<0.0002	**0.0027**	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.228**	**0.0125**	**0.0003**	**0.0112**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.0166**	**0.0005**	<0.0002	**0.0028**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0244**	**0.0007**	<0.0002	**0.0075**	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0035**	<0.0002	<0.0002	**0.0014**	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0057**	<0.0002	<0.0002	**0.0041**	<0.0002
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SB02_0.9-1.0**	**SB02_3.9-4.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB04_4.4-4.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-006**	**ES1627710-007**	**ES1627710-008**	**ES1627710-009**	**ES1627710-010**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.0128**	<0.0005	<0.0005	**0.0020**	<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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.348**	**0.0152**	**0.0003**	**0.0684**	**0.0003**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.275**	**0.0138**	**0.0003**	**0.0399**	**0.0003**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.341**	**0.0150**	**0.0003**	**0.0617**	**0.0003**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**81.5**	----	**83.0**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**90.8**	----	**94.1**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**102**	----	**95.0**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**105**	----	**106**	----	----
Anthracene-d10	1719-06-8	0.5	%	**118**	----	**117**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**94.2**	----	**96.6**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**89.0**	----	**95.9**	----	----
Toluene-D8	2037-26-5	0.2	%	**95.4**	----	**100**	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**106**	----	**103**	----	----
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**SB02_0.9-1.0**	**SB02_3.9-4.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB04_4.4-4.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-006**	**ES1627710-007**	**ES1627710-008**	**ES1627710-009**	**ES1627710-010**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**89.7**	**96.1**	**128**	**110**	**127**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW03_0.9-1.0**	**MW03_17.0-18.0**	**MW04_1.9-2.0**	**MW04_17.0-18.0**	**MW02_0.9-1.0**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-011**	**ES1627710-012**	**ES1627710-013**	**ES1627710-014**	**ES1627710-015**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**9.6**	<1.0	**14.7**	**3.0**	**19.4**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	----	----	----	----	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	----	----
Iron	7439-89-6	50	mg/kg	----	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	**8**	----	<5	----	<5
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	----	<1
Chromium	7440-47-3	2	mg/kg	**44**	----	**14**	----	**14**
Copper	7440-50-8	5	mg/kg	**6**	----	**7**	----	**8**
Lead	7439-92-1	5	mg/kg	**22**	----	**10**	----	**9**
Nickel	7440-02-0	2	mg/kg	**7**	----	**6**	----	**8**
Zinc	7440-66-6	5	mg/kg	**10**	----	**15**	----	**23**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	<0.1	----	<0.1
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	----	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW03_0.9-1.0**	**MW03_17.0-18.0**	**MW04_1.9-2.0**	**MW04_17.0-18.0**	**MW02_0.9-1.0**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-011**	**ES1627710-012**	**ES1627710-013**	**ES1627710-014**	**ES1627710-015**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	----	**0.6**	----	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	----	**1.2**	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	----	<10
C10 - C14 Fraction	----	50	mg/kg	<50	----	<50	----	<50
C15 - C28 Fraction	----	100	mg/kg	<100	----	<100	----	<100
C29 - C36 Fraction	----	100	mg/kg	<100	----	<100	----	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	----	<50	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	----	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	<10	----	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	----	<50	----	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	----	<100	----	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	----	<100	----	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	<50	----	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	<50	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**MW03_0.9-1.0**	**MW03_17.0-18.0**	**MW04_1.9-2.0**	**MW04_17.0-18.0**	**MW02_0.9-1.0**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-011**	**ES1627710-012**	**ES1627710-013**	**ES1627710-014**	**ES1627710-015**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	**0.0010**	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0045**	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<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	<0.0002
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**MW03_0.9-1.0**	**MW03_17.0-18.0**	**MW04_1.9-2.0**	**MW04_17.0-18.0**	**MW02_0.9-1.0**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-011**	**ES1627710-012**	**ES1627710-013**	**ES1627710-014**	**ES1627710-015**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	**0.0055**	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0055**	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	**0.0055**	<0.0002	<0.0002
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**80.7**	----	**75.3**	----	**75.0**
2-Chlorophenol-D4	93951-73-6	0.5	%	**76.8**	----	**81.7**	----	**85.4**
2.4.6-Tribromophenol	118-79-6	0.5	%	**73.1**	----	**81.2**	----	**83.0**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**105**	----	**99.9**	----	**99.3**
Anthracene-d10	1719-06-8	0.5	%	**114**	----	**110**	----	**110**
4-Terphenyl-d14	1718-51-0	0.5	%	**93.7**	----	**90.3**	----	**93.8**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**96.5**	----	**98.2**	----	**93.1**
Toluene-D8	2037-26-5	0.2	%	**102**	----	**105**	----	**105**
4-Bromofluorobenzene	460-00-4	0.2	%	**111**	----	**113**	----	**102**
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**MW03_0.9-1.0**	**MW03_17.0-18.0**	**MW04_1.9-2.0**	**MW04_17.0-18.0**	**MW02_0.9-1.0**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-011**	**ES1627710-012**	**ES1627710-013**	**ES1627710-014**	**ES1627710-015**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**114**	**122**	**103**	**104**	**124**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW02_17.0-18.0**	**SB07_0.4-0.5**	**SB07_1.6-1.7**	**SB06_0.4-0.5**	**SB06_4.9-5.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-016**	**ES1627710-017**	**ES1627710-018**	**ES1627710-019**	**ES1627710-020**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**1.0**	**13.0**	**4.6**	**20.2**	**11.8**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	----	----	----	**16600**	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	----	----	----	**570**	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	**12400**	----
Iron	7439-89-6	50	mg/kg	----	----	----	**43500**	----
Arsenic	7440-38-2	5	mg/kg	----	**9**	----	<5	----
Cadmium	7440-43-9	1	mg/kg	----	<1	----	<1	----
Chromium	7440-47-3	2	mg/kg	----	**46**	----	**34**	----
Copper	7440-50-8	5	mg/kg	----	**11**	----	**8**	----
Lead	7439-92-1	5	mg/kg	----	**19**	----	**14**	----
Nickel	7440-02-0	2	mg/kg	----	**13**	----	**8**	----
Zinc	7440-66-6	5	mg/kg	----	**19**	----	**23**	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	----	<0.1	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	<0.5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	----	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	----	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	----	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	----	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	----	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	----	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	----	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	----	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	----	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	----	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	----	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	----	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	----	<0.5	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**MW02_17.0-18.0**	**SB07_0.4-0.5**	**SB07_1.6-1.7**	**SB06_0.4-0.5**	**SB06_4.9-5.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-016**	**ES1627710-017**	**ES1627710-018**	**ES1627710-019**	**ES1627710-020**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	----	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	----	<0.5	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	----	<0.5	----	<0.5	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	----	<0.5	----	<0.5	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	----	**0.6**	----	**0.6**	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	----	**1.2**	----	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	<10	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	<50	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	<100	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	<100	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	----	<50	----	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	<10	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	----	<10	----	<10	----
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	<50	----
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	<100	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	<100	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	----	<50	----	<50	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	----	<50	----	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	<0.2	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	<0.5	----
^ **Sum of BTEX**	----	0.2	mg/kg	----	<0.2	----	<0.2	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	----	<0.5	----	<0.5	----
Naphthalene	91-20-3	1	mg/kg	----	<1	----	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**MW02_17.0-18.0**	**SB07_0.4-0.5**	**SB07_1.6-1.7**	**SB06_0.4-0.5**	**SB06_4.9-5.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-016**	**ES1627710-017**	**ES1627710-018**	**ES1627710-019**	**ES1627710-020**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<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	<0.0002
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**MW02_17.0-18.0**	**SB07_0.4-0.5**	**SB07_1.6-1.7**	**SB06_0.4-0.5**	**SB06_4.9-5.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-016**	**ES1627710-017**	**ES1627710-018**	**ES1627710-019**	**ES1627710-020**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	**79.7**	----	**77.7**	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	**90.4**	----	**76.2**	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	**79.4**	----	**80.6**	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	**108**	----	**89.8**	----
Anthracene-d10	1719-06-8	0.5	%	----	**116**	----	**105**	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	**98.0**	----	**87.5**	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	**97.7**	----	**96.6**	----
Toluene-D8	2037-26-5	0.2	%	----	**96.7**	----	**99.4**	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	**111**	----	**110**	----
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**MW02_17.0-18.0**	**SB07_0.4-0.5**	**SB07_1.6-1.7**	**SB06_0.4-0.5**	**SB06_4.9-5.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-016**	**ES1627710-017**	**ES1627710-018**	**ES1627710-019**	**ES1627710-020**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**114**	**111**	**111**	**116**	**122**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB05_0.4-0.5**	**SB05_4.9-5.0**	**SB08_0.4-0.5**	**SB08_3.9-4.0**	**SB09_0.9-1.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-021**	**ES1627710-022**	**ES1627710-023**	**ES1627710-024**	**ES1627710-025**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**12.6**	**6.3**	**20.4**	**8.9**	**23.1**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	----	----	----	----	**16900**
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	----	----	----	----	**690**
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	----	**10300**
Iron	7439-89-6	50	mg/kg	----	----	----	----	**34100**
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	**28**	----	----	----	**12**
Copper	7440-50-8	5	mg/kg	**16**	----	----	----	**9**
Lead	7439-92-1	5	mg/kg	**16**	----	----	----	**11**
Nickel	7440-02-0	2	mg/kg	**14**	----	----	----	**23**
Zinc	7440-66-6	5	mg/kg	**29**	----	----	----	**58**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	<0.1
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	----	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB05_0.4-0.5**	**SB05_4.9-5.0**	**SB08_0.4-0.5**	**SB08_3.9-4.0**	**SB09_0.9-1.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-021**	**ES1627710-022**	**ES1627710-023**	**ES1627710-024**	**ES1627710-025**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	----	----	----	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	----	----	----	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	----	----	----	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	----	----	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB05_0.4-0.5**	**SB05_4.9-5.0**	**SB08_0.4-0.5**	**SB08_3.9-4.0**	**SB09_0.9-1.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-021**	**ES1627710-022**	**ES1627710-023**	**ES1627710-024**	**ES1627710-025**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0003**	**0.0012**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0016**	<0.0002	**0.0013**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<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	<0.0002
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB05_0.4-0.5**	**SB05_4.9-5.0**	**SB08_0.4-0.5**	**SB08_3.9-4.0**	**SB09_0.9-1.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-021**	**ES1627710-022**	**ES1627710-023**	**ES1627710-024**	**ES1627710-025**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	**0.0016**	**0.0003**	**0.0025**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0016**	**0.0003**	**0.0025**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	**0.0016**	**0.0003**	**0.0025**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**72.7**	----	----	----	**76.9**
2-Chlorophenol-D4	93951-73-6	0.5	%	**87.2**	----	----	----	**89.4**
2.4.6-Tribromophenol	118-79-6	0.5	%	**84.5**	----	----	----	**84.6**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**104**	----	----	----	**104**
Anthracene-d10	1719-06-8	0.5	%	**113**	----	----	----	**121**
4-Terphenyl-d14	1718-51-0	0.5	%	**94.6**	----	----	----	**96.2**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**103**	----	----	----	**97.2**
Toluene-D8	2037-26-5	0.2	%	**101**	----	----	----	**107**
4-Bromofluorobenzene	460-00-4	0.2	%	**113**	----	----	----	**109**
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**SB05_0.4-0.5**	**SB05_4.9-5.0**	**SB08_0.4-0.5**	**SB08_3.9-4.0**	**SB09_0.9-1.0**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1627710-021**	**ES1627710-022**	**ES1627710-023**	**ES1627710-024**	**ES1627710-025**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**113**	**104**	**84.3**	**102**	**110**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB09_4.9-5.0**	**QA06**	**SS01**	**SS02**	**SS03**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-026**	**ES1627710-027**	**ES1627710-028**	**ES1627710-029**	**ES1627710-030**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**10.0**	**25.2**	**11.3**	**24.1**	**13.4**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	----	----	**510**	----	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	----	----	**20**	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	**10200**	----	----
Iron	7439-89-6	50	mg/kg	----	----	**24100**	----	----
Arsenic	7440-38-2	5	mg/kg	----	**5**	**7**	----	----
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	----	**11**	**25**	----	----
Copper	7440-50-8	5	mg/kg	----	**9**	**18**	----	----
Lead	7439-92-1	5	mg/kg	----	**10**	**17**	----	----
Nickel	7440-02-0	2	mg/kg	----	**27**	**13**	----	----
Zinc	7440-66-6	5	mg/kg	----	**62**	**498**	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	<0.1	----	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	**5.2**	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB09_4.9-5.0**	**QA06**	**SS01**	**SS02**	**SS03**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-026**	**ES1627710-027**	**ES1627710-028**	**ES1627710-029**	**ES1627710-030**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	<0.5	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	----	<0.5	<0.5	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	----	<0.5	<0.5	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	----	**0.6**	**0.6**	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	----	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	**1720**	----	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	**760**	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	----	<50	**2480**	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<10	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	----	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	----	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	<100	**2370**	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	**330**	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	----	<50	**2700**	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	----	<50	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	<0.5	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	----	<0.2	<0.2	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	**0.0005**	**0.0004**	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB09_4.9-5.0**	**QA06**	**SS01**	**SS02**	**SS03**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-026**	**ES1627710-027**	**ES1627710-028**	**ES1627710-029**	**ES1627710-030**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0006**	**0.0010**	**0.0022**	**0.0029**	**0.0003**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0055**	**0.0008**	**0.0248**	**0.0356**	**0.0022**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	**0.0006**	**0.0012**	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.0019**	**0.0007**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	**0.0018**	**0.0018**	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	**0.0012**	**0.0003**	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0020**	**0.0002**	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0006**	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	**0.0009**	<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	**0.0006**	**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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0006**	<0.0002
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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB09_4.9-5.0**	**QA06**	**SS01**	**SS02**	**SS03**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-026**	**ES1627710-027**	**ES1627710-028**	**ES1627710-029**	**ES1627710-030**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.0094**	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	**0.0014**	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	**0.0030**	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0061**	**0.0018**	**0.0373**	**0.0577**	**0.0025**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0061**	**0.0018**	**0.0270**	**0.0385**	**0.0025**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0061**	**0.0018**	**0.0344**	**0.0527**	**0.0025**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	**82.0**	**89.2**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	**96.6**	**97.9**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	**83.2**	**113**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	**106**	**102**	----	----
Anthracene-d10	1719-06-8	0.5	%	----	**125**	**118**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	**99.0**	**92.6**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	**109**	**101**	----	----
Toluene-D8	2037-26-5	0.2	%	----	**108**	**97.4**	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	**121**	**97.8**	----	----
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB09_4.9-5.0**	**QA06**	**SS01**	**SS02**	**SS03**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-026**	**ES1627710-027**	**ES1627710-028**	**ES1627710-029**	**ES1627710-030**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**106**	**112**	**101**	**85.9**	**85.1**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS04**	**SS05**	**SS06**	**SS09**	**QA01**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-031**	**ES1627710-032**	**ES1627710-033**	**ES1627710-034**	**ES1627710-035**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**26.4**	**26.4**	**10.4**	**37.1**	**38.7**
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	**97**	**283**	----	**3780**	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	<10	<10	----	**60**	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**5000**	**7240**	----	**19500**	----
Iron	7439-89-6	50	mg/kg	**16600**	**26600**	----	**33500**	----
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	**22**	**31**	**18**	**19**	**20**
Copper	7440-50-8	5	mg/kg	<5	**8**	**9**	**15**	**16**
Lead	7439-92-1	5	mg/kg	**10**	**10**	**24**	**18**	**20**
Nickel	7440-02-0	2	mg/kg	**3**	**6**	**8**	**12**	**13**
Zinc	7440-66-6	5	mg/kg	**20**	**22**	**33**	**168**	**173**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	**0.7**	**0.6**	----	**1.9**	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS04**	**SS05**	**SS06**	**SS09**	**QA01**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-031**	**ES1627710-032**	**ES1627710-033**	**ES1627710-034**	**ES1627710-035**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	**150**	<100	**240**	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	**150**	<50	**240**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	**80**	<50	**160**	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	**180**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	**80**	<50	**340**	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	**80**	<50	**160**	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS04**	**SS05**	**SS06**	**SS09**	**QA01**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-031**	**ES1627710-032**	**ES1627710-033**	**ES1627710-034**	**ES1627710-035**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0004**	**0.0003**	<0.0002	**0.0005**	**0.0002**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0041**	**0.0027**	**0.0004**	**0.0028**	**0.0009**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<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	<0.0002
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS04**	**SS05**	**SS06**	**SS09**	**QA01**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-031**	**ES1627710-032**	**ES1627710-033**	**ES1627710-034**	**ES1627710-035**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0045**	**0.0030**	**0.0004**	**0.0033**	**0.0011**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0045**	**0.0030**	**0.0004**	**0.0033**	**0.0011**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0045**	**0.0030**	**0.0004**	**0.0033**	**0.0011**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**86.5**	**79.6**	**80.6**	**83.9**	**87.3**
2-Chlorophenol-D4	93951-73-6	0.5	%	**97.1**	**86.8**	**89.1**	**93.0**	**94.3**
2.4.6-Tribromophenol	118-79-6	0.5	%	**112**	**118**	**106**	**121**	**120**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**102**	**102**	**104**	**108**	**103**
Anthracene-d10	1719-06-8	0.5	%	**122**	**115**	**108**	**115**	**123**
4-Terphenyl-d14	1718-51-0	0.5	%	**93.3**	**92.2**	**89.8**	**90.8**	**92.5**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**117**	**100**	**103**	**96.8**	**95.0**
Toluene-D8	2037-26-5	0.2	%	**117**	**98.1**	**104**	**90.9**	**89.0**
4-Bromofluorobenzene	460-00-4	0.2	%	**118**	**101**	**109**	**101**	**93.2**
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS04**	**SS05**	**SS06**	**SS09**	**QA01**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-031**	**ES1627710-032**	**ES1627710-033**	**ES1627710-034**	**ES1627710-035**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**95.7**	**88.8**	**125**	**75.4**	**99.4**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS07**	**SS08**	----	----	----
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-036**	**ES1627710-037**	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**23.9**	**10.8**	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	**114**	----	----	----	----
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	<10	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**3780**	----	----	----	----
Iron	7439-89-6	50	mg/kg	**27900**	----	----	----	----
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	**51**	**30**	----	----	----
Copper	7440-50-8	5	mg/kg	**9**	**10**	----	----	----
Lead	7439-92-1	5	mg/kg	**10**	**18**	----	----	----
Nickel	7440-02-0	2	mg/kg	**5**	**8**	----	----	----
Zinc	7440-66-6	5	mg/kg	**23**	**18**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS07**	**SS08**	**----**	**----**	**----**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-036**	**ES1627710-037**	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	<50	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	**0.0005**	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)				*Client sample ID*	**SS07**	**SS08**	**----**	**----**	**----**
				Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1627710-036**	**ES1627710-037**	**--------**	**--------**	**--------**
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0003**	**0.0040**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		**0.0008**	**0.0005**	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0032**	**0.0469**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	**0.0003**	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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	**0.0020**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	**0.0021**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	**0.0011**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	**0.0019**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
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	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
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	----	----	----

Analytical Results

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

			Client sample ID	**SS07**	**SS08**	**----**	**----**	**----**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-036**	**ES1627710-037**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.0014**	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	**0.0006**	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0043**	**0.0613**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0035**	**0.0509**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0035**	**0.0605**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**79.7**	**78.6**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**88.9**	**85.2**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**95.2**	**92.2**	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**102**	**102**	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**111**	**112**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**91.5**	**92.3**	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**90.8**	**99.5**	----	----	----
Toluene-D8	2037-26-5	0.2	%	**90.9**	**99.4**	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**96.5**	**106**	----	----	----
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**SS07**	**SS08**	**----**	**----**	**----**
			Client sampling date / time	01-Dec-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-036**	**ES1627710-037**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**127**	**97.6**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: **SOLID** (Matrix: **SOIL**)			*Client sample ID*	**SB03_Asphalt_0-0.08**	**SB09_Concrete_0-0.2**	**----**	**----**	**----**
			Client sampling date / time	30-Nov-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-042**	**ES1627710-043**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**2.1**	**3.7**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0008**	**0.0372**	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0004**	**0.0123**	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0025**	**0.0758**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0005**	**0.0060**	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0325**	**0.106**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	**0.021**	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0005**	**0.0367**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0005**	**0.0898**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	**0.0055**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0004**	**0.0124**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
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	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	**0.0006**	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: **SOLID** (Matrix: **SOIL**)			Client sample ID	**SB03_Asphalt_0-0.08**	**SB09_Concrete_0-0.2**	----	----	----
			Client sampling date / time	30-Nov-2016 00:00	01-Dec-2016 00:00	----	----	----
Compound	CAS Number	LOR	Unit	**ES1627710-042**	**ES1627710-043**	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.0028**	----	----	----
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	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0381**	**0.406**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0350**	**0.182**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0372**	**0.387**	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**92.6**	**81.3**	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)	*Client sample ID*			**SW01**	**SW02**	**QA101**	**SW03**	**----**
	Client sampling date / time			28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	01-Dec-2016 00:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-038**	**ES1627710-039**	**ES1627710-040**	**ES1627710-041**	--------
				Result	Result	Result	Result	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**137**	**137**	----	**245**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**39**	**45**	----	**51**	----
Total Alkalinity as CaCO3	----	1	mg/L	**39**	**45**	----	**51**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**14**	<1	----	**2**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**2**	**1**	----	**4**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**7**	**8**	----	**8**	----
Magnesium	7439-95-4	1	mg/L	**4**	**1**	----	**3**	----
Sodium	7440-23-5	1	mg/L	**12**	**11**	----	**13**	----
Potassium	7440-09-7	1	mg/L	**1**	**4**	----	**3**	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.004**	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	**0.001**	<0.001	**0.002**	**0.002**	----
Lead	7439-92-1	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.002**	**0.001**	**0.001**	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**1.13**	**0.93**	----	**1.17**	----
Total Cations	----	0.01	meq/L	**1.23**	**1.06**	----	**1.29**	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW01**	**SW02**	**QA101**	**SW03**	**----**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	01-Dec-2016 00:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-038**	**ES1627710-039**	**ES1627710-040**	**ES1627710-041**	**--------**
				Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1	µg/L	<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	----
Chrysene	218-01-9	1	µg/L	<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	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<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	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	**80**	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	**80**	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	**120**	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	**120**	<100	<100	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	<100	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW01	SW02	QA101	SW03	----
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	01-Dec-2016 00:00	----
Compound	CAS Number	LOR	Unit	ES1627710-038	ES1627710-039	ES1627710-040	ES1627710-041	--------
				Result	Result	Result	Result	----
EP080: BTEXN - Continued								
^ 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	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.29**	**0.03**	**0.03**	**0.05**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.36**	**0.02**	**0.02**	**0.04**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**3.11**	**0.18**	**0.17**	**0.25**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.21**	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**15.0**	**0.61**	**0.65**	**0.79**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	**1.48**	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**1.88**	**0.05**	**0.06**	**0.07**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	**0.54**	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.95**	**0.03**	**0.03**	**0.04**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	**0.18**	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	**0.08**	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<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	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<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	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	**0.03**	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW01**	**SW02**	**QA101**	**SW03**	**----**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	01-Dec-2016 00:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1627710-038**	**ES1627710-039**	**ES1627710-040**	**ES1627710-041**	**--------**
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<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	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<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	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<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	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	**5.27**	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	**0.54**	<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	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**29.9**	**0.92**	**0.96**	**1.24**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**18.1**	**0.79**	**0.82**	**1.04**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**29.1**	**0.90**	**0.94**	**1.20**	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**28.7**	**20.1**	**23.4**	**22.4**	----
2-Chlorophenol-D4	93951-73-6	1	%	**63.3**	**44.6**	**50.0**	**51.5**	----
2.4.6-Tribromophenol	118-79-6	1	%	**81.6**	**46.7**	**59.6**	**60.0**	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	**82.7**	**56.8**	**77.4**	**71.4**	----
Anthracene-d10	1719-06-8	1	%	**94.1**	**99.3**	**91.6**	**86.1**	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER)**			Client sample ID	**SW01**	**SW02**	**QA101**	**SW03**	**----**
			Client sampling date / time	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	01-Dec-2016 00:00	----
Compound	CAS Number	LOR	Unit	**ES1627710-038**	**ES1627710-039**	**ES1627710-040**	**ES1627710-041**	**--------**
				Result	Result	Result	Result	----
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	1	%	**79.5**	**66.2**	**78.9**	**71.5**	**----**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**103**	**106**	**99.0**	**110**	**----**
Toluene-D8	2037-26-5	2	%	**104**	**99.0**	**97.4**	**108**	**----**
4-Bromofluorobenzene	460-00-4	2	%	**95.1**	**90.8**	**92.0**	**96.2**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**96.0**	**105**	**118**	**100**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

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

Sub-Matrix: **SOLID**

		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130

Sub-Matrix: **WATER**

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1627710**

Client : **GHD PTY LTD**
Contact : MR BEN ANDERSON
Address : LEVEL 15, 133 CASTLEREAGH STREET
SYDNEY NSW, AUSTRALIA 2000
Telephone : +61 07 5413 8161
Project : 21-25583-04 Armidale
Order number : ----
C-O-C number : ----
Sampler : TERRY NHAM
Site : ----
Quote number : EN/005/15
No. of samples received : 112
No. of samples analysed : 43

Page : 1 of 26

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 : 02-Dec-2016
Date Analysis Commenced : 05-Dec-2016
Issue Date : 21-Dec-2016

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Lana Nguyen	Senior LCMS Chemist	Sydney Inorganics, 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 hig

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 (%)*
EA055: Moisture Content (QC Lot: 680617)									
ES1627691-035	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	22.7	22.2	2.66	0% - 20%
ES1627710-002	MW1_3.0-3.1	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	13.5	14.2	5.11	0% - 50%
EA055: Moisture Content (QC Lot: 680618)									
ES1627710-011	MW03_0.9-1.0	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	9.6	10.2	5.54	0% - 50%
ES1627710-022	SB05_4.9-5.0	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	6.3	7.3	14.4	No Limit
EA055: Moisture Content (QC Lot: 680619)									
ES1627710-031	SS04	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	26.4	26.7	1.22	0% - 20%
ES1627718-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	12.9	12.1	6.05	0% - 50%
ED040S: Soluble Major Anions (QC Lot: 679208)									
ES1627710-025	SB09_0.9-1.0	ED040S: Silicon	7440-21-3	1	mg/kg	16900	18900	10.9	0% - 20%
ES1627737-006	Anonymous	ED040S: Silicon	7440-21-3	1	mg/kg	41	40	0.00	0% - 20%
ED093S: Soluble Major Cations (QC Lot: 679207)									
ES1627710-025	SB09_0.9-1.0	ED093S: Potassium	7440-09-7	10	mg/kg	690	780	12.8	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 680957)									
ES1627710-001	MW1_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	13	21	42.4	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	11	17.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	14	19	31.5	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	3220	3070	4.89	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	6540	6260	4.34	0% - 20%
ES1627710-027	QA06	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	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 (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 680957) - continued									
ES1627710-027	QA06	EG005T: Chromium	7440-47-3	2	mg/kg	11	10	11.2	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	27	24	11.8	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	62	51	18.1	0% - 50%
		EG005T: Aluminium	7429-90-5	50	mg/kg	9880	8900	10.4	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	37100	36600	1.22	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 680956)									
ES1627710-001	MW1_0.5-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1627710-027	QA06	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP004: Organic Matter (QC Lot: 681659)									
ES1627710-006	SB02_0.9-1.0	EP004: Total Organic Carbon	----	0.5	%	<0.5	<0.5	0.00	No Limit
ES1627748-001	Anonymous	EP004: Total Organic Carbon	----	0.5	%	1.4	1.5	7.61	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 678733)									
ES1627710-001	MW1_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
		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): 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
ES1627710-027	QA06	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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 678733) - continued									
ES1627710-027	QA06	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): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 678148)									
ES1627710-001	MW1_0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1627710-025	SB09_0.9-1.0	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 678734)									
ES1627710-001	MW1_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
ES1627710-027	QA06	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 678148)									
ES1627710-001	MW1_0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1627710-025	SB09_0.9-1.0	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 678734)									
ES1627710-001	MW1_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
ES1627710-027	QA06	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 678148)									
ES1627710-001	MW1_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

Sub-Matrix: **SOIL**				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 678148) - continued									
ES1627710-001	MW1_0.5-0.6	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
ES1627710-025	SB09_0.9-1.0	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 678063)									
ES1627710-001	MW1_0.5-0.6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0004	0.0005	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0048	0.0049	3.62	0% - 20%
		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	0.0054	0.0060	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES1627710-011	MW03_0.9-1.0	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 678064)									
ES1627710-021	SB05_0.4-0.5	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
ES1627710-031	SS04	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	0.0004	0.0005	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	0.0041	0.0040	0.00	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 678063)									
ES1627710-001	MW1_0.5-0.6	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0014	0.0014	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 (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 678063) - continued									
ES1627710-001	MW1_0.5-0.6	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0004	0.0005	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
ES1627710-011	MW03_0.9-1.0	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 678064)									
ES1627710-021	SB05_0.4-0.5	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
ES1627710-031	SS04	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

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 (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 678064) - continued									
ES1627710-031	SS04	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 678063)									
ES1627710-001	MW1_0.5-0.6	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
ES1627710-011	MW03_0.9-1.0	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 678064)									
ES1627710-021	SB05_0.4-0.5	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

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 (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 678064) - continued									
ES1627710-021	SB05_0.4-0.5	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
ES1627710-031	SS04	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 678063)									
ES1627710-001	MW1_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
ES1627710-011	MW03_0.9-1.0	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 678064)									
ES1627710-021	SB05_0.4-0.5	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 (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 678064) - continued									
ES1627710-021	SB05_0.4-0.5	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1627710-031	SS04	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 (%)*
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 678564)									
ES1627600-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	738	741	0.406	0% - 20%
ES1627711-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3000	3090	2.85	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 677911)									
ES1627619-009	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	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ES1627631-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	96	99	3.33	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	96	99	3.33	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 679360)									
ES1627505-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	984	962	2.28	0% - 20%
ES1627665-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 679361)									
ES1627710-039	SW02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES1627715-024	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 679359)									
ES1627505-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	558	554	0.534	0% - 20%
ES1627665-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	193	193	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 679362)									
ES1627710-039	SW02	ED045G: Chloride	16887-00-6	1	mg/L	1	1	0.00	No Limit
ES1627715-024	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 680696)									
ES1627715-024	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	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 (%)*
ED093F: Dissolved Major Cations (QC Lot: 680696) - continued									
ES1627715-024	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	<1	1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1627710-041	SW03	ED093F: Calcium	7440-70-2	1	mg/L	8	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	13	13	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 680694)									
ES1627627-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.005	0.00	No Limit
ES1627681-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0010	0.0015	41.0	0% - 50%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.073	0.074	1.95	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.004	112	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.009	133	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.011	0.011	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.512	0.546	6.28	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 680697)									
ES1627710-041	SW03	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.003	71.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 680693)									
ES1627627-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1627672-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 680015)									
ES1627706-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1627785-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 680015)									
ES1627706-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1627785-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 680015)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 680015) - continued									
ES1627706-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1627785-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 678057)									
ES1627672-001	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: 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
ES1627710-038	SW01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	15.0	14.5	3.28	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.29	0.30	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.36	0.35	3.66	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.11	3.09	0.516	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.21	0.20	0.00	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 678057)									
ES1627672-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.07	0.07	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	0.07	0.07	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.04	0.04	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
ES1627710-038	SW01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.95	0.96	1.57	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
				Laboratory Duplicate (DUP) Report					
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 678057) - continued									
ES1627710-038	SW01	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.48	1.50	1.35	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.88	1.89	0.00	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.54	0.58	6.59	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.18	0.17	8.45	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.08	0.06	32.2	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 678057)									
ES1627672-001	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
ES1627710-038	SW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.03	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 678057)									
ES1627672-001	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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 678057) - continued									
ES1627672-001	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
ES1627710-038	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	5.27	4.70	11.4	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.54	0.62	15.0	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 678057)									
ES1627672-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.18	0.18	0.00	0% - 50%
ES1627710-038	SW01	EP231X: Sum of PFAS	----	0.01	µg/L	29.9	28.9	3.33	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 Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
ED093S: Soluble Major Cations (QCLot: 679207)								
ED093S: Potassium	7440-09-7	10	mg/kg	<10	50 mg/kg	89.3	83	125
EG005T: Total Metals by ICP-AES (QCLot: 680957)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	107	70	130
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	97.9	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.2	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	85.8	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.6	86	120
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	82.4	70	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	96.1	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	93.2	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	96.9	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 680956)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	82.0	70	105
EP004: Organic Matter (QCLot: 681659)								
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	98.5	81	99
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 678733)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	109	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	107	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	112	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	118	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	107	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	102	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	90.9	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	97.9	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	106	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	98.0	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	110	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	96.2	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	110	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.8	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	96.1	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	77.6	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678148)								

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678148) - continued								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	91.6	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678734)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	105	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	110	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	104	71	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678148)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	93.1	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678734)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	105	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	108	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	89.7	63	131
EP080: BTEXN (QCLot: 678148)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	90.3	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.2	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	92.9	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	86.7	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	90.7	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	85.8	63	119
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 678063)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.5	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.0	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.6	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.8	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 678064)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678063)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00125 mg/kg	80.3	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.3	57	128

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678063) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.0	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.6	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678064)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00125 mg/kg	89.0	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.1	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678063)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.7	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	67.6	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	73.9	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	65.5	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.0	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678064)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.1	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	76.7	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	64.6	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	58	125

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678064) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678063)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	102	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.8	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678064)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	98.2	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	120	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	60	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 678564)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 293 mg/L	99.5 109	87 66	109 126
ED037P: Alkalinity by PC Titrator (QCLot: 677911)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	95.2	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 679360)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 679361)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 679359)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	120 95.1	81 81	127 127
ED045G: Chloride by Discrete Analyser (QCLot: 679362)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	120 94.2	81 81	127 127
ED093F: Dissolved Major Cations (QCLot: 680696)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.8	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.0	85	113

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 680694)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.6	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.1	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.1	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.4	81	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 680697)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.6	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.7	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.5	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 680693)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.3	83	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 678768)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	69.2	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	71.8	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	76.2	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	74.2	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	70.2	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	83.5	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	82.2	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	92.5	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	81.3	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	80.1	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	73.9	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	83.6	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	74.0	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	72.5	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	74.3	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	69.6	59	118
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 678773)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	67.1	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	69.4	64	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 678773) - continued								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	69.8	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	70.3	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	71.8	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	67.9	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	77.8	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	79.6	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	71.5	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	70.2	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	72.0	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	76.0	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	80.0	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	81.4	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	85.0	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	78.5	59	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678766)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	97.7	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	98.0	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	99.4	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678774)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	98.4	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	97.9	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	96.8	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 680015)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	83.3	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678766)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	89.5	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	93.7	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.3	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678774)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	97.4	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	95.0	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.6	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 680015)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	79.6	75	127
EP080: BTEXN (QCLot: 680015)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	90.2	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	82.3	69	123

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP080: BTEXN (QCLot: 680015) - continued								
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	81.0	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	81.2	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	82.1	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	81.8	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 678057)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	86.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	96.8	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	89.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678057)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.5 µg/L	107	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	91.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	114	71	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	103	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	107	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	83.0	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	113	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678057)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	119	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	113	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	120	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	113	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678057)								
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	97.8	70	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678057) - continued								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	93.4	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	108	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**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 680957)							
ES1627710-001	MW1_0.5-0.6	EG005T: Arsenic	7440-38-2	50 mg/kg	94.4	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.8	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	104	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	101	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	101	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	101	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 680956)							
ES1627710-001	MW1_0.5-0.6	EG035T: Mercury	7439-97-6	5 mg/kg	87.9	70	130
EP004: Organic Matter (QCLot: 681659)							
ES1627710-006	SB02_0.9-1.0	EP004: Total Organic Carbon	----	2.66 %	110	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 678733)							
ES1627710-001	MW1_0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	92.5	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	105	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678148)							
ES1627710-001	MW1_0.5-0.6	EP080: C6 - C9 Fraction	----	32.5 mg/kg	88.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 678734)							
ES1627710-001	MW1_0.5-0.6	EP071: C10 - C14 Fraction	----	523 mg/kg	79.6	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	94.4	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	101	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678148)							
ES1627710-001	MW1_0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	94.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678734)							
ES1627710-001	MW1_0.5-0.6	EP071: >C10 - C16 Fraction	----	860 mg/kg	84.4	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	100.0	53	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	*SpikeRecovery(%)*	*Recovery Limits (%)*	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 678734) - continued							
ES1627710-001	MW1_0.5-0.6	EP071: >C34 - C40 Fraction	----	1058 mg/kg	94.2	52	132
EP080: BTEXN (QCLot: 678148)							
ES1627710-001	MW1_0.5-0.6	EP080: Benzene	71-43-2	2.5 mg/kg	90.8	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	89.1	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	89.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	87.0	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	87.5	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	82.1	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 678063)							
ES1627710-001	MW1_0.5-0.6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	74.8	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.4	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	95.5	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	108	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	69.0	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 678064)							
ES1627710-021	SB05_0.4-0.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	89.9	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	82.4	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	96.9	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	97.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	99.7	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	77.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678063)							
ES1627710-001	MW1_0.5-0.6	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00125 mg/kg	102	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	99.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	98.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	113	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	111	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	114	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	88.1	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	75.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	82.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	90.9	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	35.8	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678064)							
ES1627710-021	SB05_0.4-0.5	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00125 mg/kg	80.1	50	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*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678064) - continued							
ES1627710-021	SB05_0.4-0.5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	99.1	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	98.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	112	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	98.0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	103	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	104	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	111	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	93.6	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678063)							
ES1627710-001	MW1_0.5-0.6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	81.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	50.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	58.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	63.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	63.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	76.5	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	71.6	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678064)							
ES1627710-021	SB05_0.4-0.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	74.7	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	68.5	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	75.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	66.4	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	55.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	111	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	105	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678063)							
ES1627710-001	MW1_0.5-0.6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	95.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	100	50	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*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678063) - continued							
ES1627710-001	MW1_0.5-0.6	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	100	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	87.7	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678064)							
ES1627710-021	SB05_0.4-0.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	98.1	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	120	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	97.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	99.5	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*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 679360)							
ES1627505-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 679361)							
ES1627710-039	SW02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	122	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 679359)							
ES1627505-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	77.8	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 679362)							
ES1627710-039	SW02	ED045G: Chloride	16887-00-6	250 mg/L	102	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 680694)							
ES1627627-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	111	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	112	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	105	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	107	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	108	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	109	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 680697)							
ES1627835-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	108	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	110	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	99.3	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	105	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	105	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	105	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	110	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 680693)							

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*
EG035F: Dissolved Mercury by FIMS (QCLot: 680693) - continued							
ES1627627-003	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	87.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 680015)							
ES1627706-003	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	80.8	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 680015)							
ES1627706-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	77.3	70	130
EP080: BTEXN (QCLot: 680015)							
ES1627706-003	Anonymous	EP080: Benzene	71-43-2	25 µg/L	80.8	70	130
		EP080: Toluene	108-88-3	25 µg/L	82.8	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	84.4	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	86.8	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	87.0	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	89.2	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 678057)							
ES1627672-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	95.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	99.0	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	105	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	107	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	111	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	108	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 678057)							
ES1627672-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.5 µg/L	83.8	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	99.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	99.2	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	110	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	103	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	97.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	107	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	109	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	103	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	88.8	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	92.6	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678057)							
ES1627672-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	94.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	118	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	114	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 678057) - continued							
ES1627672-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	109	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	112	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	106	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	102	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 678057)							
ES1627672-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	112	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	96.0	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	95.4	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1627710**	Page	: 1 of 20
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: 21-25583-04 Armidale	Date Samples Received	: 02-Dec-2016
Site	: ----	Issue Date	: 21-Dec-2016
Sampler	: TERRY NHAM	No. of samples received	: 112
Order number	: ----	No. of samples analysed	: 43

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

- **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**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1627710--001	MW1_0.5-0.6	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1627505--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Control Samples (LCS)					
Major Anions - Soluble	0	9	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)					
Major Anions - Soluble	0	9	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	33	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	29	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	33	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	29	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.

Matrix: **SOIL**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container */ Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA055: Moisture Content							
Snap Lock Bag (EA055-103) SB09_Concrete_0-0.2	**01-Dec-2016**	----	----	----	**06-Dec-2016**	15-Dec-2016	✓
Snap Lock Bag (EA055-103) SB03_Asphalt_0-0.08	**30-Nov-2016**	----	----	----	**06-Dec-2016**	14-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA055-103) MW04_1.9-2.0, MW04_17.0-18.0, MW02_0.9-1.0, MW02_17.0-18.0, SB07_0.4-0.5, SB07_1.6-1.7, SB06_0.4-0.5, SB06_4.9-5.0, SB05_0.4-0.5, SB05_4.9-5.0, SB08_0.4-0.5, SB08_3.9-4.0, SB09_0.9-1.0, SB09_4.9-5.0, QA06, SS07, SS08	**01-Dec-2016**	----	----	----	**06-Dec-2016**	15-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA055-103) SS01, SS02, SS03, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	----	----	----	**06-Dec-2016**	12-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA055-103) MW1_0.5-0.6, MW1_3.0-3.1	**29-Nov-2016**	----	----	----	**06-Dec-2016**	13-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA055-103) SB01_0.5-0.6, SB01_2.9-3.0, QA02, SB02_0.9-1.0, SB02_3.9-4.0, SB03_0.9-1.0, SB04_0.4-0.5, SB04_4.4-4.5, MW03_0.9-1.0, MW03_17.0-18.0	**30-Nov-2016**	----	----	----	**06-Dec-2016**	14-Dec-2016	✓
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040S) SB06_0.4-0.5, SB09_0.9-1.0, SS07	**01-Dec-2016**	**06-Dec-2016**	29-Dec-2016	✓	**09-Dec-2016**	03-Jan-2017	✓
Soil Glass Jar - Unpreserved (ED040S) SS01, SS04, SS05, SS09	**28-Nov-2016**	**06-Dec-2016**	26-Dec-2016	✓	**09-Dec-2016**	03-Jan-2017	✓
Soil Glass Jar - Unpreserved (ED040S) SB02_0.9-1.0, SB03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	28-Dec-2016	✓	**09-Dec-2016**	03-Jan-2017	✓

Matrix: **SOIL**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED093S: Soluble Major Cations							
Soil Glass Jar - Unpreserved (ED093S) SB06_0.4-0.5, SB09_0.9-1.0, SS07	**01-Dec-2016**	**06-Dec-2016**	30-May-2017	✓	**09-Dec-2016**	30-May-2017	✓
Soil Glass Jar - Unpreserved (ED093S) SS01, SS04, SS05, SS09	**28-Nov-2016**	**06-Dec-2016**	27-May-2017	✓	**09-Dec-2016**	27-May-2017	✓
Soil Glass Jar - Unpreserved (ED093S) SB02_0.9-1.0, SB03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	29-May-2017	✓	**09-Dec-2016**	29-May-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) MW04_1.9-2.0, MW02_0.9-1.0, SB07_0.4-0.5, SB06_0.4-0.5, SB05_0.4-0.5, SB09_0.9-1.0, QA06, SS07, SS08	**01-Dec-2016**	**06-Dec-2016**	30-May-2017	✓	**06-Dec-2016**	30-May-2017	✓
Soil Glass Jar - Unpreserved (EG005T) SS01, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**06-Dec-2016**	27-May-2017	✓	**06-Dec-2016**	27-May-2017	✓
Soil Glass Jar - Unpreserved (EG005T) MW1_0.5-0.6	**29-Nov-2016**	**06-Dec-2016**	28-May-2017	✓	**06-Dec-2016**	28-May-2017	✓
Soil Glass Jar - Unpreserved (EG005T) SB02_0.9-1.0, SB03_0.9-1.0, MW03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	29-May-2017	✓	**06-Dec-2016**	29-May-2017	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) MW04_1.9-2.0, MW02_0.9-1.0, SB07_0.4-0.5, SB06_0.4-0.5, SB05_0.4-0.5, SB09_0.9-1.0, QA06, SS07, SS08	**01-Dec-2016**	**06-Dec-2016**	29-Dec-2016	✓	**07-Dec-2016**	29-Dec-2016	✓
Soil Glass Jar - Unpreserved (EG035T) SS01, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**06-Dec-2016**	26-Dec-2016	✓	**07-Dec-2016**	26-Dec-2016	✓
Soil Glass Jar - Unpreserved (EG035T) MW1_0.5-0.6	**29-Nov-2016**	**06-Dec-2016**	27-Dec-2016	✓	**07-Dec-2016**	27-Dec-2016	✓
Soil Glass Jar - Unpreserved (EG035T) SB02_0.9-1.0, SB03_0.9-1.0, MW03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	28-Dec-2016	✓	**07-Dec-2016**	28-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*
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004) SB06_0.4-0.5, SB09_0.9-1.0, SS07	**01-Dec-2016**	**07-Dec-2016**	29-Dec-2016	✓	**07-Dec-2016**	29-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP004) SS01, SS04, SS05, SS09	**28-Nov-2016**	**07-Dec-2016**	26-Dec-2016	✓	**07-Dec-2016**	26-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP004) SB02_0.9-1.0, SB03_0.9-1.0	**30-Nov-2016**	**07-Dec-2016**	28-Dec-2016	✓	**07-Dec-2016**	28-Dec-2016	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) MW04_1.9-2.0, MW02_0.9-1.0, SB07_0.4-0.5, SB06_0.4-0.5, SB05_0.4-0.5, SB09_0.9-1.0, QA06, SS07, SS08	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) SS01, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	15-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) MW1_0.5-0.6	**29-Nov-2016**	**06-Dec-2016**	13-Dec-2016	✓	**06-Dec-2016**	15-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) SB02_0.9-1.0, SB03_0.9-1.0, MW03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	14-Dec-2016	✓	**06-Dec-2016**	15-Jan-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) MW04_1.9-2.0, MW02_0.9-1.0, SB07_0.4-0.5, SB06_0.4-0.5, SB05_0.4-0.5, SB09_0.9-1.0, QA06, SS07, SS08	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) SS01, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	12-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) MW1_0.5-0.6	**29-Nov-2016**	**06-Dec-2016**	13-Dec-2016	✓	**06-Dec-2016**	13-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) SB02_0.9-1.0, SB03_0.9-1.0, MW03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	14-Dec-2016	✓	**06-Dec-2016**	14-Dec-2016	✓

Matrix: **SOIL**

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

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation* ***Date extracted***	 *Due for extraction*	 *Evaluation*	*Analysis* ***Date analysed***	 *Due for analysis*	 *Evaluation*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) MW04_1.9-2.0, MW02_0.9-1.0, SB07_0.4-0.5, SB06_0.4-0.5, SB05_0.4-0.5, SB09_0.9-1.0, QA06, SS07, SS08	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) SS01, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	12-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) MW1_0.5-0.6	**29-Nov-2016**	**06-Dec-2016**	13-Dec-2016	✓	**06-Dec-2016**	13-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) SB02_0.9-1.0, SB03_0.9-1.0, MW03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	14-Dec-2016	✓	**06-Dec-2016**	14-Dec-2016	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) MW04_1.9-2.0, MW02_0.9-1.0, SB07_0.4-0.5, SB06_0.4-0.5, SB05_0.4-0.5, SB09_0.9-1.0, QA06, SS07, SS08	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) SS01, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	12-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) MW1_0.5-0.6	**29-Nov-2016**	**06-Dec-2016**	13-Dec-2016	✓	**06-Dec-2016**	13-Dec-2016	✓
Soil Glass Jar - Unpreserved (EP080) SB02_0.9-1.0, SB03_0.9-1.0, MW03_0.9-1.0	**30-Nov-2016**	**06-Dec-2016**	14-Dec-2016	✓	**06-Dec-2016**	14-Dec-2016	✓

Matrix: **SOIL**

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

Method		**Sample Date**	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			**Date extracted**	Due for extraction	Evaluation	**Date analysed**	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
MW04_1.9-2.0,	MW04_17.0-18.0,	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
MW02_0.9-1.0,	MW02_17.0-18.0,							
SB07_0.4-0.5,	SB07_1.6-1.7,							
SB06_0.4-0.5,	SB06_4.9-5.0,							
SB05_0.4-0.5,	SB05_4.9-5.0,							
SB08_0.4-0.5,	SB08_3.9-4.0,							
SB09_0.9-1.0,	SB09_4.9-5.0,							
QA06,	SS07,							
SS08								
HDPE Soil Jar (EP231X)								
SS01,	SS02,	**28-Nov-2016**	**07-Dec-2016**	27-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
SS03,	SS04,							
SS05,	SS06,							
SS09,	QA01							
HDPE Soil Jar (EP231X)								
MW1_0.5-0.6,	MW1_3.0-3.1	**29-Nov-2016**	**07-Dec-2016**	28-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X)								
SB01_0.5-0.6,	SB01_2.9-3.0,	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
QA02,	SB02_0.9-1.0,							
SB02_3.9-4.0,	SB03_0.9-1.0,							
SB04_0.4-0.5,	SB04_4.4-4.5,							
MW03_0.9-1.0,	MW03_17.0-18.0							
Snap Lock Bag (EP231X)								
SB09_Concrete_0-0.2		**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X)								
SB03_Asphalt_0-0.08		**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-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*
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) MW04_1.9-2.0, MW04_17.0-18.0, MW02_0.9-1.0, MW02_17.0-18.0, SB07_0.4-0.5, SB07_1.6-1.7, SB06_0.4-0.5, SB06_4.9-5.0, SB05_0.4-0.5, SB05_4.9-5.0, SB08_0.4-0.5, SB08_3.9-4.0, SB09_0.9-1.0, SB09_4.9-5.0, QA06, SS07, SS08	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**07-Dec-2016**	27-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) MW1_0.5-0.6, MW1_3.0-3.1	**29-Nov-2016**	**07-Dec-2016**	28-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SB01_0.5-0.6, SB01_2.9-3.0, QA02, SB02_0.9-1.0, SB02_3.9-4.0, SB03_0.9-1.0, SB04_0.4-0.5, SB04_4.4-4.5, MW03_0.9-1.0, MW03_17.0-18.0	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB09_Concrete_0-0.2	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB03_Asphalt_0-0.08	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-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
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) MW04_1.9-2.0, MW04_17.0-18.0, MW02_0.9-1.0, MW02_17.0-18.0, SB07_0.4-0.5, SB07_1.6-1.7, SB06_0.4-0.5, SB06_4.9-5.0, SB05_0.4-0.5, SB05_4.9-5.0, SB08_0.4-0.5, SB08_3.9-4.0, SB09_0.9-1.0, SB09_4.9-5.0, QA06, SS07, SS08	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**07-Dec-2016**	27-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) MW1_0.5-0.6, MW1_3.0-3.1	**29-Nov-2016**	**07-Dec-2016**	28-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SB01_0.5-0.6, SB01_2.9-3.0, QA02, SB02_0.9-1.0, SB02_3.9-4.0, SB03_0.9-1.0, SB04_0.4-0.5, SB04_4.4-4.5, MW03_0.9-1.0, MW03_17.0-18.0	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB09_Concrete_0-0.2	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB03_Asphalt_0-0.08	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓

Matrix: **SOIL**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) MW04_1.9-2.0, MW04_17.0-18.0, MW02_0.9-1.0, MW02_17.0-18.0, SB07_0.4-0.5, SB07_1.6-1.7, SB06_0.4-0.5, SB06_4.9-5.0, SB05_0.4-0.5, SB05_4.9-5.0, SB08_0.4-0.5, SB08_3.9-4.0, SB09_0.9-1.0, SB09_4.9-5.0, QA06, SS07, SS08	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**07-Dec-2016**	27-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) MW1_0.5-0.6, MW1_3.0-3.1	**29-Nov-2016**	**07-Dec-2016**	28-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SB01_0.5-0.6, SB01_2.9-3.0, QA02, SB02_0.9-1.0, SB02_3.9-4.0, SB03_0.9-1.0, SB04_0.4-0.5, SB04_4.4-4.5, MW03_0.9-1.0, MW03_17.0-18.0	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB09_Concrete_0-0.2	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB03_Asphalt_0-0.08	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-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
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) MW04_1.9-2.0, MW04_17.0-18.0, MW02_0.9-1.0, MW02_17.0-18.0, SB07_0.4-0.5, SB07_1.6-1.7, SB06_0.4-0.5, SB06_4.9-5.0, SB05_0.4-0.5, SB05_4.9-5.0, SB08_0.4-0.5, SB08_3.9-4.0, SB09_0.9-1.0, SB09_4.9-5.0, QA06, SS07, SS08	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS09, QA01	**28-Nov-2016**	**07-Dec-2016**	27-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) MW1_0.5-0.6, MW1_3.0-3.1	**29-Nov-2016**	**07-Dec-2016**	28-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
HDPE Soil Jar (EP231X) SB01_0.5-0.6, SB01_2.9-3.0, QA02, SB02_0.9-1.0, SB02_3.9-4.0, SB03_0.9-1.0, SB04_0.4-0.5, SB04_4.4-4.5, MW03_0.9-1.0, MW03_17.0-18.0	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB09_Concrete_0-0.2	**01-Dec-2016**	**07-Dec-2016**	30-May-2017	✓	**07-Dec-2016**	16-Jan-2017	✓
Snap Lock Bag (EP231X) SB03_Asphalt_0-0.08	**30-Nov-2016**	**07-Dec-2016**	29-May-2017	✓	**07-Dec-2016**	16-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
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	08-Dec-2016	✓
Clear Plastic Bottle - Natural (EA015H) SW01, SW02	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	05-Dec-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	15-Dec-2016	✓
Clear Plastic Bottle - Natural (ED037-P) SW01, SW02	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	12-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*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	29-Dec-2016	✓
Clear Plastic Bottle - Natural (ED041G) SW01, SW02	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	26-Dec-2016	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	29-Dec-2016	✓
Clear Plastic Bottle - Natural (ED045G) SW01, SW02	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	26-Dec-2016	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) SW03	**01-Dec-2016**	**----**	----	----	**06-Dec-2016**	29-Dec-2016	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) SW01, SW02	**28-Nov-2016**	**----**	----	----	**06-Dec-2016**	26-Dec-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) SW03	**01-Dec-2016**	**----**	----	----	**06-Dec-2016**	30-May-2017	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**06-Dec-2016**	27-May-2017	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) SW03	**01-Dec-2016**	**----**	----	----	**07-Dec-2016**	29-Dec-2016	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**07-Dec-2016**	26-Dec-2016	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) SW03	**01-Dec-2016**	**06-Dec-2016**	08-Dec-2016	✓	**07-Dec-2016**	15-Jan-2017	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) SW01, SW02, QA101	**28-Nov-2016**	**05-Dec-2016**	05-Dec-2016	✓	**06-Dec-2016**	14-Jan-2017	✓

Matrix: **WATER**

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

Method ***Container** / Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation* ***Date extracted***	 *Due for extraction*	 *Evaluation*	*Analysis* ***Date analysed***	 *Due for analysis*	 *Evaluation*
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) SW03	**01-Dec-2016**	**06-Dec-2016**	08-Dec-2016	✓	**07-Dec-2016**	15-Jan-2017	✓
Amber Glass Bottle - Unpreserved (EP071) SW01, SW02, QA101	**28-Nov-2016**	**05-Dec-2016**	05-Dec-2016	✓	**06-Dec-2016**	14-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW03	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Dec-2016	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW02, QA101	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	12-Dec-2016	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) SW03	**01-Dec-2016**	**06-Dec-2016**	08-Dec-2016	✓	**07-Dec-2016**	15-Jan-2017	✓
Amber Glass Bottle - Unpreserved (EP071) SW01, SW02, QA101	**28-Nov-2016**	**05-Dec-2016**	05-Dec-2016	✓	**06-Dec-2016**	14-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW03	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Dec-2016	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW02, QA101	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	12-Dec-2016	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) SW03	**01-Dec-2016**	**06-Dec-2016**	15-Dec-2016	✓	**06-Dec-2016**	15-Dec-2016	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW02, QA101	**28-Nov-2016**	**06-Dec-2016**	12-Dec-2016	✓	**06-Dec-2016**	12-Dec-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	30-May-2017	✓
HDPE (no PTFE) (EP231X) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	27-May-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	30-May-2017	✓
HDPE (no PTFE) (EP231X) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	27-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
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	30-May-2017	✓
HDPE (no PTFE) (EP231X) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	27-May-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	30-May-2017	✓
HDPE (no PTFE) (EP231X) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	27-May-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SW03	**01-Dec-2016**	**----**	----	----	**05-Dec-2016**	30-May-2017	✓
HDPE (no PTFE) (EP231X) SW01, SW02, QA101	**28-Nov-2016**	**----**	----	----	**05-Dec-2016**	27-May-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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Cations - soluble by ICP-AES	ED093S	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	2	9	**22.22**	**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	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Cations - soluble by ICP-AES	ED093S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	0	9	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	0	9	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	33	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	29	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	33	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	29	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055-103	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).
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. 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 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 (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
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.
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)

Analytical Methods	Method	Matrix	Method Descriptions
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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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 (SnCl2)(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 SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
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.
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, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
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.

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 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
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304
Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: Sydney
PROJECT: 21-25583-04 Armidale
ORDER NUMBER:
PROJECT MANAGER: Ben Anderson
CONTACT PH: 02 9239 7170 / 0408 713 343
SAMPLER: Terry Nham
SAMPLER MOBILE: 0403 251 883
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: ben.anderson@ghd.com terry.nham@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g.. Ultra Trace
☒ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

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

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)	Tamie		
DATE/TIME: 12/12/2016	DATE/TIME: 12/12/16 10.50am	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | 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).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFCs (Full Suite)	PFCs (Full Suite) - Leachability	TOC, Total Iron, K, Al, Si	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TDS	Major Anions and Cations
	MW01	8/12/16	Water		6	X			X	X	X
	QA102				6	Please send to Eurofin with attached coc.					
	MW02				6	X			X	X	X
	MW03				6	X			X	X	X
	MW04				6	X			X	X	X
	SW04				6	X			X	X	X
	SW06				6	X				X	X
	SW07				6	X				X	X
	SW08	↓	↓		6	X				X	X
				TOTAL							

Environmental Division
Sydney
Work Order Reference
ES1628450

Telephone : + 61-2-8784 8555

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.

CERTIFICATE OF ANALYSIS

Work Order	: **ES1628450**	Page	: 1 of 22
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	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 08 6222 8222	Telephone	: +61-2-8784 8555
Project	: 21-25583-04 Armidale	Date Samples Received	: 12-Dec-2016 10:50
Order number	: ----	Date Analysis Commenced	: 13-Dec-2016
C-O-C number	: ----	Issue Date	: 19-Dec-2016 09:32
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 29		
No. of samples analysed	: 23		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	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.

- TDS by method EA-015 may bias high for samples 6 and 8 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- 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*	**SS11**	**SS12**	**SS13**	**SS14**	**SS15**
			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*	**ES1628450-010**	**ES1628450-011**	**ES1628450-012**	**ES1628450-013**	**ES1628450-014**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**35.6**	**30.1**	**19.6**	**15.0**	**26.1**
ED040S : Soluble Sulfate by ICPAES								
Silica	7631-86-9	1	mg/kg	**----**	**----**	**1570**	**----**	**----**
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**----**	**----**	**7330**	**----**	**----**
Iron	7439-89-6	50	mg/kg	**----**	**----**	**28500**	**----**	**----**
Potassium	7440-09-7	50	mg/kg	**----**	**----**	**370**	**----**	**----**
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	**----**	**----**	**1.2**	**----**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0011**	**0.0002**	**0.0005**	**0.0004**	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0199**	**0.0048**	**0.0112**	**0.0114**	**0.0014**
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	**0.0004**	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.0005**	<0.0002	**0.0003**	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0003**	<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	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS11**	**SS12**	**SS13**	**SS14**	**SS15**
			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	**ES1628450-010**	**ES1628450-011**	**ES1628450-012**	**ES1628450-013**	**ES1628450-014**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0230**	**0.0050**	**0.0120**	**0.0118**	**0.0014**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0210**	**0.0050**	**0.0117**	**0.0118**	**0.0014**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0224**	**0.0050**	**0.0120**	**0.0118**	**0.0014**
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS11**	**SS12**	**SS13**	**SS14**	**SS15**
			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	**ES1628450-010**	**ES1628450-011**	**ES1628450-012**	**ES1628450-013**	**ES1628450-014**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**92.9**	**124**	**94.2**	**95.9**	**99.1**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS16**	**SS17**	**SB10_0.3-0.4**	**SB10_0.6-0.7**	**SB10_1.2-.3**
			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*	**ES1628450-015**	**ES1628450-016**	**ES1628450-018**	**ES1628450-019**	**ES1628450-020**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**32.1**	**29.4**	**19.0**	**14.1**	**10.5**
ED040S : Soluble Sulfate by ICPAES								
Silica	7631-86-9	1	mg/kg	**1650**	**2020**	----	----	**18600**
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**10300**	**11400**	----	----	**8530**
Iron	7439-89-6	50	mg/kg	**31400**	**24500**	----	----	**15700**
Potassium	7440-09-7	50	mg/kg	**670**	**780**	----	----	**320**
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	<0.5	**3.5**	----	----	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0034**	**0.0026**	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<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	<0.0002
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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**SS16**	**SS17**	**SB10_0.3-0.4**	**SB10_0.6-0.7**	**SB10_1.2-.3**
			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*	**ES1628450-015**	**ES1628450-016**	**ES1628450-018**	**ES1628450-019**	**ES1628450-020**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0034**	**0.0026**	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0034**	**0.0026**	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0034**	**0.0026**	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS16**	**SS17**	**SB10_0.3-0.4**	**SB10_0.6-0.7**	**SB10_1.2-.3**
			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	**ES1628450-015**	**ES1628450-016**	**ES1628450-018**	**ES1628450-019**	**ES1628450-020**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**86.9**	**89.5**	**103**	**84.5**	**91.7**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SB11_0.2-0.3**	**SB11_0.5-0.6**	**SB11_1.2-1.3**	**SB12_0-0.1**	**SB12_0.8-0.9**
			Client sampling date / time	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-022**	**ES1628450-024**	**ES1628450-026**	**ES1628450-027**	**ES1628450-029**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**16.0**	**13.1**	**20.2**	**17.2**	**18.5**
ED040S : Soluble Sulfate by ICPAES								
Silica	7631-86-9	1	mg/kg	----	----	----	----	**24800**
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	----	**17400**
Iron	7439-89-6	50	mg/kg	----	----	----	----	**16500**
Potassium	7440-09-7	50	mg/kg	----	----	----	----	**830**
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	----	**0.8**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0005**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<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	<0.0002
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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SB11_0.2-0.3**	**SB11_0.5-0.6**	**SB11_1.2-1.3**	**SB12_0-0.1**	**SB12_0.8-0.9**
			Client sampling date / time	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-022**	**ES1628450-024**	**ES1628450-026**	**ES1628450-027**	**ES1628450-029**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<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	<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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0005**	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0005**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0005**	<0.0002
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**SB11_0.2-0.3**	**SB11_0.5-0.6**	**SB11_1.2-1.3**	**SB12_0-0.1**	**SB12_0.8-0.9**
			Client sampling date / time	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00	09-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-022**	**ES1628450-024**	**ES1628450-026**	**ES1628450-027**	**ES1628450-029**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	**101**	**115**	**88.8**	**124**	**104**

Analytical Results

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

			Client sample ID	**MW01**	**MW02**	**MW03**	**MW04**	**SW04**
			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*	**ES1628450-001**	**ES1628450-003**	**ES1628450-004**	**ES1628450-005**	**ES1628450-006**
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**1060**	**857**	**1040**	**464**	**229**
ED037P: Alkalinity by PC Titrator								
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	**425**	**291**	**361**	**282**	**91**
Total Alkalinity as CaCO3	----	1	mg/L	**425**	**291**	**361**	**282**	**91**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**170**	**394**	**383**	**170**	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**319**	**57**	**148**	**45**	**7**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**188**	**120**	**175**	**89**	**17**
Magnesium	7439-95-4	1	mg/L	**77**	**70**	**73**	**41**	**7**
Sodium	7440-23-5	1	mg/L	**85**	**82**	**80**	**50**	**17**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**3**	**2**	**2**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<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	**0.003**	**0.001**	**0.001**	<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	**0.010**	**0.008**	**0.004**	**0.003**	**0.004**
Zinc	7440-66-6	0.005	mg/L	**0.041**	**0.030**	**0.040**	**0.013**	<0.005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**21.0**	**15.6**	**19.4**	**10.4**	**2.02**
Total Cations	----	0.01	meq/L	**19.5**	**15.4**	**18.3**	**10.0**	**2.22**
Ionic Balance	----	0.01	%	**3.86**	**0.83**	**2.83**	**1.96**	**----**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
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
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

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**MW01**	**MW02**	**MW03**	**MW04**	**SW04**
			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*	**ES1628450-001**	**ES1628450-003**	**ES1628450-004**	**ES1628450-005**	**ES1628450-006**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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
EP080/071: Total Petroleum Hydrocarbons								
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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
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
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			*Client sample ID*	MW01	MW02	MW03	MW04	SW04
			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*	**ES1628450-001**	**ES1628450-003**	**ES1628450-004**	**ES1628450-005**	**ES1628450-006**
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
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
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.23**	**0.03**	**0.45**	<0.02	**0.29**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.14**	<0.02	**0.38**	<0.02	**0.29**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.32**	**0.09**	**0.55**	<0.02	**2.28**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.02**	<0.02	<0.02	<0.02	**0.26**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.19**	**0.10**	**0.66**	**0.03**	**7.90**
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.39**	<0.02	**0.12**	<0.02	**1.08**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.35**	**0.04**	**0.39**	<0.02	**1.08**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	**0.06**	<0.02	**0.05**	<0.02	**0.38**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.03**	**0.03**	**0.03**	<0.01	**0.43**
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
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

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

			Client sample ID	**MW01**	**MW02**	**MW03**	**MW04**	**SW04**
			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	**ES1628450-001**	**ES1628450-003**	**ES1628450-004**	**ES1628450-005**	**ES1628450-006**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.96**
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**1.73**	**0.29**	**2.63**	**0.03**	**15.0**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.51**	**0.19**	**1.21**	**0.03**	**10.2**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**1.57**	**0.29**	**2.25**	**0.03**	**14.4**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**21.3**	**18.7**	**22.7**	**18.9**	**16.4**
2-Chlorophenol-D4	93951-73-6	1	%	**42.8**	**41.7**	**46.4**	**40.4**	**44.4**
2.4.6-Tribromophenol	118-79-6	1	%	**47.7**	**58.1**	**60.6**	**44.8**	**56.9**
EP075(SIM)T: PAH Surrogates								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**MW01**	**MW02**	**MW03**	**MW04**	**SW04**
			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*	**ES1628450-001**	**ES1628450-003**	**ES1628450-004**	**ES1628450-005**	**ES1628450-006**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
2-Fluorobiphenyl	321-60-8	1	%	**60.7**	**65.4**	**63.3**	**51.8**	**54.8**
Anthracene-d10	1719-06-8	1	%	**92.4**	**77.7**	**98.3**	**87.0**	**83.7**
4-Terphenyl-d14	1718-51-0	1	%	**92.1**	**98.2**	**101**	**79.4**	**81.3**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**117**	**113**	**112**	**110**	**131**
Toluene-D8	2037-26-5	2	%	**101**	**92.0**	**95.8**	**99.6**	**117**
4-Bromofluorobenzene	460-00-4	2	%	**98.3**	**91.9**	**93.5**	**95.9**	**106**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**94.4**	**94.7**	**89.7**	**92.3**	**90.5**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW06**	**SW07**	**SW08**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-007**	**ES1628450-008**	**ES1628450-009**	**--------**	**--------**
				Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**65**	**333**	**81**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**48**	**48**	**56**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**48**	**48**	**56**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	**12**	**8**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**5**	**12**	**10**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**8**	**10**	**12**	----	----
Magnesium	7439-95-4	1	mg/L	**4**	**4**	**6**	----	----
Sodium	7440-23-5	1	mg/L	**9**	**16**	**10**	----	----
Potassium	7440-09-7	1	mg/L	**2**	**3**	**2**	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	----
Copper	7440-50-8	0.001	mg/L	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**1.10**	**1.55**	**1.57**	----	----
Total Cations	----	0.01	meq/L	**1.17**	**1.60**	**1.58**	----	----
Ionic Balance	----	0.01	%	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	----	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	----	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	----	----	----	----	----
Fluorene	86-73-7	1	µg/L	----	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW06**	**SW07**	**SW08**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-007**	**ES1628450-008**	**ES1628450-009**	**--------**	**--------**
				Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	1	µg/L	----	----	----	----	----
Anthracene	120-12-7	1	µg/L	----	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	----	----	----	----	----
Pyrene	129-00-0	1	µg/L	----	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	----	----	----	----	----
Chrysene	218-01-9	1	µg/L	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L	----	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	----	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	----	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	----	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	----	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	----	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	----	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	----	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	----	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	----	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	----	----	----
Toluene	108-88-3	2	µg/L	----	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW06**	**SW07**	**SW08**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-007**	**ES1628450-008**	**ES1628450-009**	**--------**	**--------**
				Result	Result	Result	----	----
EP080: BTEXN - Continued								
ortho-Xylene	95-47-6	2	µg/L	----	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	----	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	----	----	----	----	----
Naphthalene	91-20-3	5	µg/L	----	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.11**	**0.04**	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.10**	**0.04**	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.80**	**0.26**	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.09**	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**2.33**	**0.66**	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.18**	**0.06**	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.28**	**0.10**	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	**0.09**	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.13**	**0.03**	<0.01	----	----
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	----	----
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW06**	**SW07**	**SW08**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-007**	**ES1628450-008**	**ES1628450-009**	**--------**	**--------**
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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	----	----
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	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**4.11**	**1.19**	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**3.13**	**0.92**	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**3.92**	**1.15**	<0.01	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%	----	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%	----	----	----	----	----
EP075(SIM)T: PAH Surrogates								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW06**	**SW07**	**SW08**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1628450-007**	**ES1628450-008**	**ES1628450-009**	**--------**	**--------**
				Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates - Continued								
2-Fluorobiphenyl	321-60-8	1	%	----	----	----	----	----
Anthracene-d10	1719-06-8	1	%	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%	----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**93.7**	**90.5**	**87.6**	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)* Low	*Recovery Limits (%)* High
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130

Sub-Matrix: **WATER**

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

QUALITY CONTROL REPORT

Work Order : **ES1628450**

Client : **GHD PTY LTD**
Contact : MR BEN ANDERSON
Address : LEVEL 15, 133 CASTLEREAGH STREET
SYDNEY NSW, AUSTRALIA 2000
Telephone : +61 08 6222 8222
Project : 21-25583-04 Armidale
Order number : ----
C-O-C number : ----
Sampler : TERRY NHAM
Site : ----
Quote number : EN/005/15
No. of samples received : 29
No. of samples analysed : 23

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 : 12-Dec-2016
Date Analysis Commenced : 13-Dec-2016
Issue Date : 19-Dec-2016

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

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

This Quality Control Report contains the following information:

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

Signatories

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

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

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 (%)*
EA055: Moisture Content (QC Lot: 689631)									
ES1628437-012	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	21.7	21.9	1.03	0% - 20%
ES1628450-015	SS16	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	32.1	32.2	0.352	0% - 20%
EA055: Moisture Content (QC Lot: 689632)									
ES1628450-029	SB12_0.8-0.9	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	18.5	18.8	1.81	0% - 50%
ES1628473-019	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	3.8	4.1	8.46	No Limit
ED040S: Soluble Major Anions (QC Lot: 689183)									
ES1628450-015	SS16	ED040S: Silica	7631-86-9	1	mg/kg	1650	1880	13.4	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 692830)									
ES1628101-149	Anonymous	EG005T: Aluminium	7429-90-5	50	mg/kg	15900	13800	13.7	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	19700	23800	18.7	0% - 20%
ES1628421-001	Anonymous	EG005T: Aluminium	7429-90-5	50	mg/kg	7050	7330	3.87	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	56000	61400	9.12	0% - 20%
EP004: Organic Matter (QC Lot: 689656)									
ES1628450-012	SS13	EP004: Total Organic Carbon	----	0.5	%	1.2	1.2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 688908)									
ES1628450-010	SS11	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	0.0011	0.0011	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	0.0199	0.0212	6.47	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
ES1628450-022	SB11_0.2-0.3	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

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 (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 688908) - continued									
ES1628450-022	SB11_0.2-0.3	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)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 688908)									
ES1628450-010	SS11	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	0.0006	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	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	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
ES1628450-022	SB11_0.2-0.3	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 688908)									
ES1628450-010	SS11	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

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 (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 688908) - continued									
ES1628450-022	SB11_0.2-0.3	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 688908)									
ES1628450-010	SS11	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
ES1628450-022	SB11_0.2-0.3	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 (%)*
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 693487)									
ES1628308-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	368	362	1.64	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 691683)									
ES1628321-021	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	234	231	1.61	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	234	231	1.61	0% - 20%
ES1628321-030	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	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 (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 691683) - continued									
ES1628321-030	Anonymous	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	371	368	0.901	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	371	368	0.901	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 691684)									
ES1628512-005	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	310	313	1.04	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	310	313	1.04	0% - 20%
ES1628512-014	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	76	76	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	76	76	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 691629)									
ES1628450-001	MW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	170	164	3.48	0% - 20%
ES1628647-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	78	77	2.10	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 691630)									
ES1628450-001	MW01	ED045G: Chloride	16887-00-6	1	mg/L	319	319	0.00	0% - 20%
ES1628492-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 691473)									
ES1628451-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	15	15	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	17	16	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
ES1628450-001	MW01	ED093F: Calcium	7440-70-2	1	mg/L	188	181	3.87	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	77	76	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	85	84	1.28	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 691471)									
ES1628450-001	MW01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	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	0.010	0.010	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.041	0.039	3.88	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 691472)									
ES1628450-005	MW04	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 693463)									
ES1628261-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	80	80	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 (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 693463) - continued									
ES1628429-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 693463)									
ES1628261-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	80	80	0.00	No Limit
ES1628429-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 693463)									
ES1628261-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1628429-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 689719)									
ES1628240-012	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: 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)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1628450-004	MW03	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.66	0.66	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.45	0.43	4.51	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.38	0.36	5.64	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.55	0.56	2.34	0% - 20%
		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)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 689719)									
ES1628240-012	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: 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

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 (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 689719) - continued									
ES1628240-012	Anonymous	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
ES1628450-004	MW03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.03	0.02	43.1	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.12	0.12	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.39	0.40	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.05	0.05	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 689719)									
ES1628240-012	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
ES1628450-004	MW03	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

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 (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 689719) - continued									
ES1628450-004	MW03	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 689719)									
ES1628240-012	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
ES1628450-004	MW03	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
EP231P: PFAS Sums (QC Lot: 689719)									
ES1628240-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1628450-004	MW03	EP231X: Sum of PFAS	----	0.01	µg/L	2.63	2.60	1.15	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 Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EG005T: Total Metals by ICP-AES (QCLot: 692830)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	130	70	130
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	76.7	70	130
EG005T: Potassium	7440-09-7	50	mg/kg	<50	----	----	----	----
EP004: Organic Matter (QCLot: 689656)								
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	# 100	81	99
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 688908)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.1	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.9	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 688908)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	83.7	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.2	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.2	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.7	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.1	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.2	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.6	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 688908)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.9	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	70.2	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	61	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 688908) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.4	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 688908)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.2	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	88.6	60	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 693487)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 293 mg/L	89.8 84.0	87 66	109 126
ED037P: Alkalinity by PC Titrator (QCLot: 691683)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	93.7	81	111
ED037P: Alkalinity by PC Titrator (QCLot: 691684)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	93.1	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 691629)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	113	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 691630)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	104 103	81 81	127 127
ED093F: Dissolved Major Cations (QCLot: 691473)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.2	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	92.3	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	90.6	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.1	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 691471)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	89.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.5	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.1	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	86.8	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.0	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 691472)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.7	83	105

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 688549)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	69.0	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	78.0	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	81.1	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	77.2	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	70.9	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	71.5	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	82.2	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	70.8	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	65.1	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	74.1	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	67.3	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	71.4	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	68.0	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	71.7	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	73.6	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	73.4	59	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 688550)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	104	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	104	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	100	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 693463)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	102	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 688550)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	90.7	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	91.5	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	102	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 693463)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	106	75	127
EP080: BTEXN (QCLot: 693463)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.8	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	92.9	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	94.9	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	96.6	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	93.7	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 689719)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 689719) - continued								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	96.6	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	117	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 689719)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	103	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	82.0	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	96.4	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	113	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	97.5	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 689719)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	80.3	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	93.5	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	82.6	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.2	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	88.4	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 689719)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	87.2	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
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	86.0	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	97.2	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: **SOIL**

				Matrix Spike (MS) Report			
				Spike	*SpikeRecovery(%)*	*Recovery Limits (%)*	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP004: Organic Matter (QCLot: 689656)							
ES1628450-012	SS13	EP004: Total Organic Carbon	----	2.66 %	# Not Determined	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 688908)							
ES1628450-010	SS11	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	64.0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	86.9	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	77.4	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	81.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.00125 mg/kg	64.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 688908)							
ES1628450-010	SS11	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	103	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	74.0	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	91.3	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	79.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	102	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	92.4	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	58.9	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	110	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	104	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	67.3	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 688908)							
ES1628450-010	SS11	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	63.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	106	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	68.8	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	98.3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	48.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	76.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	115	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 688908)							

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*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 688908) - continued							
ES1628450-010	SS11	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	85.2	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	108	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	98.2	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	94.4	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*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 691629)							
ES1628450-001	MW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 691630)							
ES1628450-001	MW01	ED045G: Chloride	16887-00-6	250 mg/L	101	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 691471)							
ES1628450-003	MW02	EG020A-F: Arsenic	7440-38-2	1 mg/L	101	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	96.9	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	96.9	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	94.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	93.2	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	95.6	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	98.4	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 691472)							
ES1628450-004	MW03	EG035F: Mercury	7439-97-6	0.01 mg/L	81.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 693463)							
ES1628261-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	106	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 693463)							
ES1628261-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	108	70	130
EP080: BTEXN (QCLot: 693463)							
ES1628261-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	77.4	70	130
		EP080: Toluene	108-88-3	25 µg/L	86.0	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	101	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	106	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	111	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	108	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 689719)							
ES1628240-012	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	98.4	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*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 689719) - continued							
ES1628240-012	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	84.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	99.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	84.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	88.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.5 µg/L	99.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 689719)							
ES1628240-012	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	82.8	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	82.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	80.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	79.0	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	90.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	94.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	84.4	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	83.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	81.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	84.8	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	81.9	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 689719)							
ES1628240-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	86.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	87.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	86.9	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	82.3	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	83.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	83.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	88.0	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 689719)							
ES1628240-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	88.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	81.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	79.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	92.0	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1628450**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: 21-25583-04 Armidale	Date Samples Received	: 12-Dec-2016
Site	: ----	Issue Date	: 19-Dec-2016
Sampler	: TERRY NHAM	No. of samples received	: 29
Order number	: ----	No. of samples analysed	: 23

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.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : 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**
Laboratory Control Spike (LCS) Recoveries							
EP004: Organic Matter	QC-689656-002	----	**Total Organic Carbon**	----	100 %	81-99%	**Recovery greater than upper control limit**
Matrix Spike (MS) Recoveries							
EP004: Organic Matter	ES1628450--012	SS13	**Total Organic Carbon**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1628450--010	SS11	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1628450--001	MW01	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Control Samples (LCS)					
Major Anions - Soluble	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)					
Major Anions - Soluble	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Total Metals by ICP-AES	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103) SS11, SS12, SS13, SS14, SS15, SS16, SS17, SB10_0.3-0.4, SB10_0.6-0.7, SB10_1.2-.3	**08-Dec-2016**	**----**	----	----	**13-Dec-2016**	22-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA055-103) SB11_0.2-0.3, SB11_0.5-0.6, SB11_1.2-1.3, SB12_0-0.1, SB12_0.8-0.9	**09-Dec-2016**	**----**	----	----	**13-Dec-2016**	23-Dec-2016	✓
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040S) SS13, SS16, SS17, SB10_1.2-.3	**08-Dec-2016**	**13-Dec-2016**	05-Jan-2017	✓	**13-Dec-2016**	10-Jan-2017	✓
Soil Glass Jar - Unpreserved (ED040S) SB12_0.8-0.9	**09-Dec-2016**	**13-Dec-2016**	06-Jan-2017	✓	**13-Dec-2016**	10-Jan-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) SS13, SS16, SS17, SB10_1.2-.3	**08-Dec-2016**	**15-Dec-2016**	06-Jun-2017	✓	**15-Dec-2016**	06-Jun-2017	✓
Soil Glass Jar - Unpreserved (EG005T) SB12_0.8-0.9	**09-Dec-2016**	**15-Dec-2016**	07-Jun-2017	✓	**15-Dec-2016**	07-Jun-2017	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004) SS13, SS16, SS17, SB10_1.2-.3	**08-Dec-2016**	**14-Dec-2016**	05-Jan-2017	✓	**14-Dec-2016**	05-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP004) SB12_0.8-0.9	**09-Dec-2016**	**14-Dec-2016**	06-Jan-2017	✓	**14-Dec-2016**	06-Jan-2017	✓

Matrix: **SOIL**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS11, SS12, SS13, SS14, SS15, SS16, SS17, SB10_0.3-0.4, SB10_0.6-0.7, SB10_1.2-.3	**08-Dec-2016**	**15-Dec-2016**	06-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
HDPE Soil Jar (EP231X) SB11_0.2-0.3, SB11_0.5-0.6, SB11_1.2-1.3, SB12_0-0.1, SB12_0.8-0.9	**09-Dec-2016**	**15-Dec-2016**	07-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS11, SS12, SS13, SS14, SS15, SS16, SS17, SB10_0.3-0.4, SB10_0.6-0.7, SB10_1.2-.3	**08-Dec-2016**	**15-Dec-2016**	06-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
HDPE Soil Jar (EP231X) SB11_0.2-0.3, SB11_0.5-0.6, SB11_1.2-1.3, SB12_0-0.1, SB12_0.8-0.9	**09-Dec-2016**	**15-Dec-2016**	07-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS11, SS12, SS13, SS14, SS15, SS16, SS17, SB10_0.3-0.4, SB10_0.6-0.7, SB10_1.2-.3	**08-Dec-2016**	**15-Dec-2016**	06-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
HDPE Soil Jar (EP231X) SB11_0.2-0.3, SB11_0.5-0.6, SB11_1.2-1.3, SB12_0-0.1, SB12_0.8-0.9	**09-Dec-2016**	**15-Dec-2016**	07-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
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS11, SS12, SS13, SS14, SS15, SS16, SS17, SB10_0.3-0.4, SB10_0.6-0.7, SB10_1.2-.3	**08-Dec-2016**	**15-Dec-2016**	06-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
HDPE Soil Jar (EP231X) SB11_0.2-0.3, SB11_0.5-0.6, SB11_1.2-1.3, SB12_0-0.1, SB12_0.8-0.9	**09-Dec-2016**	**15-Dec-2016**	07-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS11, SS12, SS13, SS14, SS15, SS16, SS17, SB10_0.3-0.4, SB10_0.6-0.7, SB10_1.2-.3	**08-Dec-2016**	**15-Dec-2016**	06-Jun-2017	✓	**15-Dec-2016**	24-Jan-2017	✓
HDPE Soil Jar (EP231X) SB11_0.2-0.3, SB11_0.5-0.6, SB11_1.2-1.3, SB12_0-0.1, SB12_0.8-0.9	**09-Dec-2016**	**15-Dec-2016**	07-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
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**15-Dec-2016**	15-Dec-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**14-Dec-2016**	22-Dec-2016	✓

Matrix: **WATER**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**14-Dec-2016**	05-Jan-2017	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**14-Dec-2016**	05-Jan-2017	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**14-Dec-2016**	05-Jan-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**----**	----	----	**14-Dec-2016**	06-Jun-2017	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**----**	----	----	**15-Dec-2016**	05-Jan-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**15-Dec-2016**	15-Dec-2016	✓	**16-Dec-2016**	24-Jan-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**15-Dec-2016**	15-Dec-2016	✓	**16-Dec-2016**	24-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**15-Dec-2016**	22-Dec-2016	✓	**15-Dec-2016**	22-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*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**15-Dec-2016**	15-Dec-2016	✓	**16-Dec-2016**	24-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**15-Dec-2016**	22-Dec-2016	✓	**15-Dec-2016**	22-Dec-2016	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) MW01, MW02, MW03, MW04, SW04	**08-Dec-2016**	**15-Dec-2016**	22-Dec-2016	✓	**15-Dec-2016**	22-Dec-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**13-Dec-2016**	06-Jun-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**13-Dec-2016**	06-Jun-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**13-Dec-2016**	06-Jun-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) MW01, MW02, MW03, MW04, SW04, SW06, SW07, SW08	**08-Dec-2016**	**----**	----	----	**13-Dec-2016**	06-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
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
MW01,	MW02,	**08-Dec-2016**	**----**	----	----	**13-Dec-2016**	06-Jun-2017	✓
MW03,	MW04,							
SW04,	SW06,							
SW07,	SW08							

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Major Anions - Soluble	ED040S	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Major Anions - Soluble	ED040S	0	5	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	7	**14.29**	**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
Total Metals by ICP-AES	EG005T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Major Anions - Soluble	ED040S	0	5	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	7	**14.29**	**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
Total Metals by ICP-AES	EG005T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	7	**14.29**	**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
Total Metals by ICP-AES	EG005T	0	5	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**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	14	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**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	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**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	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055-103	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).
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
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)
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)
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.
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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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)

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(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 SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
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.
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
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Fadi Soro

TMD: 13/1/17 12:40pm

From: Sepan Mahamad
Sent: Friday, 13 January 2017 12:29 PM
To: Fadi Soro
Subject: FW: ASLP Armidale - additional samples

One more rebatch please mate.

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
277-289 Woodpark Road
Smithfield NSW 2164 Australia

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From: Nicole Rosen [mailto:Nicole.Rosen@ghd.com]
Sent: Friday, 13 January 2017 11:49 AM
To: Sepan Mahamad <Sepan.Mahamad@alsglobal.com>
Cc: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Subject: RE: ASLP Armidale - additional samples

Environmental Division
Sydney
Work Order Reference
ES1700937

Telephone : + 61-2-8784 8555

ES1700037

Hi Sepan,
Left the wrong info on the top.
This one is Armidale 21/25583/04 from lab report ES1627706, ES1627710 and ES1628450

From: Nicole Rosen
Sent: Friday, 13 January 2017 11:23 AM
To: 'Sepan Mahamad' <Sepan.Mahamad@alsglobal.com>
Cc: 'ALSEnviro.Sydney@alsglobal.com' <ALSEnviro.Sydney@alsglobal.com>
Subject: ASLP Armidale - additional samples

Hi Sepan,
Albion Park 21/25583/02 – From lab report ES1627706, ES1627710, ES1628450.

The following samples are required for **ASLP** – PFAS full suite

ES1627710003 - **SB01_0.5-0.6** 1
ES1627710006 - **SB02_0.9-1.0** 2
ES1627710008 - **SB03_0.9-1.0** 3
ES1627710009 - **SB04_0.4-0.5** 4
ES1627710023 - **SB08_0.4-0.5** 5
ES1627710026 - **SB09_4.9-5.0** 6
ES1628450027 - **SB12_0.0-0.1** 7
ES1627710028 - **SS01** 8
ES1627710029 - **SS02** 9
ES1627710031 - **SS04** 10
ES1627710037 - **SS08** 11
ES1627710034 - **SS09** 12
ES1628450011 - **SS12** 13
ES1628450012 - **SS13** 14
ES1628450013 - **SS14** 15
ES1628450010 - **SS11** 16

S455-465

Separate Batch
ES1627706001 - **SS10**

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
Level 15 133 Castlereagh St Sydney NSW 2000 Australia | http://www.ghd.com/
Water | Energy & Resources | Environment | Property & Buildings | Transportation

CERTIFICATE OF ANALYSIS

Work Order : **ES1700937**
Client : **GHD PTY LTD**
Contact : MR BEN ANDERSON
Address : LEVEL 15, 133 CASTLEREAGH STREET
SYDNEY NSW, AUSTRALIA 2000
Telephone : +61 07 5413 8161
Project : 21-25583-04 Armidale
Order number : ----
C-O-C number : ----
Sampler : ----
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 : 17-Jan-2017
Issue Date : 20-Jan-2017 11:44

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic 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.

Analytical Results

Sub-Matrix: **DI WATER LEACHATE** (Matrix: **WATER**)			*Client sample ID*	**SB01_0.5-0.6**	**SB02_0.9-1.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB08_0.4-0.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-001**	**ES1700937-002**	**ES1700937-003**	**ES1700937-004**	**ES1700937-005**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.06**	**0.12**	<0.02	**0.14**	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.08**	**0.16**	<0.02	**0.14**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.73**	**1.76**	<0.02	**0.93**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.17**	**0.15**	<0.02	**0.10**	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**5.80**	**11.8**	**0.03**	**0.47**	**0.17**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
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	**0.08**	**0.46**	<0.02	**0.08**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.14**	**0.60**	<0.02	**0.16**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	**0.02**	**0.07**	<0.02	**0.03**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.13**	**0.23**	<0.01	**0.14**	<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
EP231C: Perfluoroalkyl Sulfonamides								
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*	**SB01_0.5-0.6**	**SB02_0.9-1.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB08_0.4-0.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-001**	**ES1700937-002**	**ES1700937-003**	**ES1700937-004**	**ES1700937-005**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.85**	<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
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**7.21**	**16.2**	**0.03**	**2.19**	**0.17**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**6.53**	**13.6**	**0.03**	**1.40**	**0.17**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**6.96**	**15.9**	**0.03**	**1.95**	**0.17**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**104**	**94.3**	**96.1**	**98.5**	**89.8**

Analytical Results

Sub-Matrix: **DI WATER LEACHATE** (Matrix: **WATER**)			*Client sample ID*	**SB09_4.9-5.0**	**SB12_0.0-0.1**	**SS01**	**SS02**	**SS04**
			Client sampling date / time	01-Dec-2016 00:00	09-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-006**	**ES1700937-007**	**ES1700937-008**	**ES1700937-009**	**ES1700937-010**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	**0.04**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.03**	<0.02	**0.08**	**0.04**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.46**	**0.02**	**1.33**	**1.94**	**0.12**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	**0.16**	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
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	<0.02	<0.02	**0.04**	**0.03**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	**0.03**	**0.08**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.01**	<0.01	**0.07**	**0.02**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	**0.04**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	**0.05**	<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
EP231C: Perfluoroalkyl Sulfonamides								
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*	**SB09_4.9-5.0**	**SB12_0.0-0.1**	**SS01**	**SS02**	**SS04**
			Client sampling date / time	01-Dec-2016 00:00	09-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-006**	**ES1700937-007**	**ES1700937-008**	**ES1700937-009**	**ES1700937-010**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	**0.06**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	**0.08**	<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
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.50**	**0.02**	**1.68**	**2.43**	**0.12**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.49**	**0.02**	**1.41**	**1.98**	**0.12**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.50**	**0.02**	**1.59**	**2.25**	**0.12**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**95.8**	**96.1**	**91.2**	**102**	**104**

Analytical Results

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

			Client sample ID	**SS08**	**SS09**	**SS12**	**SS13**	**SS14**
			Client sampling date / time	01-Dec-2016 00:00	28-Nov-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-011**	**ES1700937-012**	**ES1700937-013**	**ES1700937-014**	**ES1700937-015**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.03**	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.02**	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.16**	**0.05**	<0.02	**0.02**	**0.03**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.04**	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**2.36**	**0.23**	**0.20**	**0.40**	**0.47**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
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**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.07**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.05**	<0.01	<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
EP231C: Perfluoroalkyl Sulfonamides								
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	**SS08**	**SS09**	**SS12**	**SS13**	**SS14**
			Client sampling date / time	01-Dec-2016 00:00	28-Nov-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1700937-011**	**ES1700937-012**	**ES1700937-013**	**ES1700937-014**	**ES1700937-015**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**2.78**	**0.28**	**0.20**	**0.42**	**0.51**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**2.52**	**0.28**	**0.20**	**0.42**	**0.50**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**2.72**	**0.28**	**0.20**	**0.42**	**0.51**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**99.1**	**108**	**97.3**	**107**	**111**

Analytical Results

Sub-Matrix: **DI WATER LEACHATE** (Matrix: **WATER**)			*Client sample ID*	**SS11**	----	----	----	----
			Client sampling date / time	08-Dec-2016 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-016**	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.03**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.49**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
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	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
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	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
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	**SS11**	**----**	**----**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-016**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
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	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.52**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.52**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.52**	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**98.8**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**SB01_0.5-0.6**	**SB02_0.9-1.0**	**SB03_0.9-1.0**	**SB04_0.4-0.5**	**SB08_0.4-0.5**
			Client sampling date / time	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	01-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1700937-001**	**ES1700937-002**	**ES1700937-003**	**ES1700937-004**	**ES1700937-005**
				Result	Result	Result	Result	Result
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**7.9**	**7.8**	**8.1**	**8.1**	**9.2**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**SB09_4.9-5.0**	**SB12_0.0-0.1**	**SS01**	**SS02**	**SS04**
			Client sampling date / time	01-Dec-2016 00:00	09-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1700937-006**	**ES1700937-007**	**ES1700937-008**	**ES1700937-009**	**ES1700937-010**
				Result	Result	Result	Result	Result
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**10.3**	**8.6**	**7.8**	**6.9**	**6.9**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**SS08**	**SS09**	**SS12**	**SS13**	**SS14**
			Client sampling date / time	01-Dec-2016 00:00	28-Nov-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	**ES1700937-011**	**ES1700937-012**	**ES1700937-013**	**ES1700937-014**	**ES1700937-015**
				Result	Result	Result	Result	Result
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**7.4**	**7.0**	**7.6**	**8.0**	**8.0**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**SS11**	**----**	**----**	**----**	**----**
			Client sampling date / time	08-Dec-2016 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1700937-016**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**7.4**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **DI WATER LEACHATE**

Compound	*CAS Number*	***Recovery Limits (%)*** Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1700937**
Page : 1 of 7

Client : **GHD PTY LTD**
Contact : MR BEN ANDERSON
Address : LEVEL 15, 133 CASTLEREAGH STREET
SYDNEY NSW, AUSTRALIA 2000
Telephone : +61 07 5413 8161
Project : 21-25583-04 Armidale
Order number : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EN/005/15
No. of samples received : 16
No. of samples analysed : 16

Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 13-Jan-2017
Date Analysis Commenced : 17-Jan-2017
Issue Date : 20-Jan-2017

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 726278)									
ES1700937-001	SB01_0.5-0.6	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	5.80	5.13	12.2	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.08	0.07	15.2	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.73	0.65	11.6	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.17	0.16	11.6	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1700937-011	SS08	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2.36	2.46	3.98	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	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	0.16	0.16	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 726278)									
ES1700937-001	SB01_0.5-0.6	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.13	0.11	15.2	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.08	0.08	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.14	0.13	14.0	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
ES1700937-011	SS08	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	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 (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 726278) - continued									
ES1700937-011	SS08	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	0.07	0.08	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 726278)									
ES1700937-001	SB01_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
ES1700937-011	SS08	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 726278)									
ES1700937-001	SB01_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

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 (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 726278) - continued									
ES1700937-001	SB01_0.5-0.6	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
ES1700937-011	SS08	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
EP231P: PFAS Sums (QC Lot: 726278)									
ES1700937-011	SS08	EP231X: Sum of PFAS	----	0.01	µg/L	2.78	2.88	3.53	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 Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 726278)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	84.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	80.4	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	93.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	84.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	112	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 726278)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	83.6	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	81.4	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	82.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	86.0	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	95.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	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	115	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	112	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 726278)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	87.7	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	96.0	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	90.6	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	107	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	91.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	90.0	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 726278)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	90.0	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	95.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	92.0	70	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 726278) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	106	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**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 726278)							
ES1700937-001	SB01_0.5-0.6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	86.2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	76.4	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	91.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	72.2	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	116	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 726278)							
ES1700937-001	SB01_0.5-0.6	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	86.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	79.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	76.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	90.4	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	91.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	107	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	101	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	92.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	114	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	112	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	78.4	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 726278)							
ES1700937-001	SB01_0.5-0.6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	111	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	108	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	92.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	112	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	103	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 726278) - continued							
ES1700937-001	SB01_0.5-0.6	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	109	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	96.0	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 726278)							
ES1700937-001	SB01_0.5-0.6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	89.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	98.2	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	90.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	113	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1700937**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: 21-25583-04 Armidale	Date Samples Received	: 13-Jan-2017
Site	: ----	Issue Date	: 20-Jan-2017
Sampler	: ----	No. of samples received	: 16
Order number	: ----	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**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1700937--001	SB01_0.5-0.6	**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	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EN60: Bottle Leaching Procedure							
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SB08_0.4-0.5, SB09_4.9-5.0, SS08	**01-Dec-2016**	**17-Jan-2017**	30-May-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SS12, SS13, SS14, SS11	**08-Dec-2016**	**18-Jan-2017**	06-Jun-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SB12_0.0-0.1	**09-Dec-2016**	**17-Jan-2017**	07-Jun-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SS01, SS02, SS04	**28-Nov-2016**	**17-Jan-2017**	27-May-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SS09	**28-Nov-2016**	**18-Jan-2017**	27-May-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5	**30-Nov-2016**	**17-Jan-2017**	29-May-2017	✓	**----**	----	----

Matrix: **WATER**

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

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

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*
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5, SB08_0.4-0.5, SB09_4.9-5.0, SB12_0.0-0.1, SS01, SS02, SS04, SS08	**17-Jan-2017**	**----**	----	----	**19-Jan-2017**	16-Jul-2017	✓
HDPE (no PTFE) (EP231X) SS09, SS12, SS13, SS14, SS11	**18-Jan-2017**	**----**	----	----	**19-Jan-2017**	17-Jul-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5, SB08_0.4-0.5, SB09_4.9-5.0, SB12_0.0-0.1, SS01, SS02, SS04, SS08	**17-Jan-2017**	**----**	----	----	**19-Jan-2017**	16-Jul-2017	✓
HDPE (no PTFE) (EP231X) SS09, SS12, SS13, SS14, SS11	**18-Jan-2017**	**----**	----	----	**19-Jan-2017**	17-Jul-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5, SB08_0.4-0.5, SB09_4.9-5.0, SB12_0.0-0.1, SS01, SS02, SS04, SS08	**17-Jan-2017**	**----**	----	----	**19-Jan-2017**	16-Jul-2017	✓
HDPE (no PTFE) (EP231X) SS09, SS12, SS13, SS14, SS11	**18-Jan-2017**	**----**	----	----	**19-Jan-2017**	17-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*
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5, SB08_0.4-0.5, SB09_4.9-5.0, SB12_0.0-0.1, SS01, SS02, SS04, SS08	**17-Jan-2017**	**----**	----	----	**19-Jan-2017**	16-Jul-2017	✓
HDPE (no PTFE) (EP231X) SS09, SS12, SS13, SS14, SS11	**18-Jan-2017**	**----**	----	----	**19-Jan-2017**	17-Jul-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SB01_0.5-0.6, SB02_0.9-1.0, SB03_0.9-1.0, SB04_0.4-0.5, SB08_0.4-0.5, SB09_4.9-5.0, SB12_0.0-0.1, SS01, SS02, SS04, SS08	**17-Jan-2017**	**----**	----	----	**19-Jan-2017**	16-Jul-2017	✓
HDPE (no PTFE) (EP231X) SS09, SS12, SS13, SS14, SS11	**18-Jan-2017**	**----**	----	----	**19-Jan-2017**	17-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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**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	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.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Deionised Water Leach	EN60-DIa	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates

ES7710

eurofins | mgt

☑ **Sydney**
Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
Phone: +612 9900 8400
Email: enviro.syd@mgtlabmark.com.au

☐ **Brisbane**
Unit 1-21 Smallwood Place, Murrarie
Phone: +617 3902 4600
Email: enviro.bris@mgtlabmark.com.au

☐ **Melbourne**
2 Kingston Town Close, Oakleigh, VIC 3166
Phone +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Page 1 of 1

Company Name : GHD Pty Ltd, Sydney
Contact Name : Terry Nham
Purchase Order :
COC Number :
Office Address : Level 15, 133 Castlereagh Street, Sydney NSW 2000
Project Manager : Ben Anderson
PROJECT Number : 21-25583-04
Eurofins | mgt quote ID : GHD Rates 2016
Email for results : terry.nham@ghd.com ben.anderson@ghd.com
PROJECT Name : Armidale
Data output format: ESDAT

Special Directions & Comments :

Eurofins | mgt DI water batch number:

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Analytes / **Containers:**

	Sample ID	Date	Matrix	PFOS/PFOA	TRH, BTEX, PAH, 8M (Suite B7)	1LP	250P	125P	1LA	40mL vial	125mL A	Jar	Bag	Sample comments:
1	QA03	30/11/16	Soil	X	X							2		
2	QA04	1/12/16	Soil	X	X							2		
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														

Relinquished By: Terry Nham - GHD
Date & Time : 2/12/16
Signature:

Laboratory Staff
Received By: Arpan
Date & Time : 5/12 13:50
Signature:

Turn around time
1 DAY ☐ 2 DAY ☐ 3 DAY ☐
5 DAY ☑ 10 DAY ☐ Other:

Method Of Shipment
☐ Courier
☑ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival:

Report number: 526321

Certificate of Analysis

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.

GHD Pty Ltd NSW
Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Attention: **Ben Anderson**

Report **526327-S**
Project name ARMIDALE
Project ID 21-25583-04
Received Date Dec 05, 2016

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**QA03** **Soil** **S16-De04210** **Nov 30, 2016**	**QA04** **Soil** **S16-De04211** **Dec 01, 2016**
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	20	mg/kg	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50
BTEX				
Benzene	0.1	mg/kg	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	64	61
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene^{N02}	0.5	mg/kg	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)^{N01}	50	mg/kg	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20
TRH C6-C10 less BTEX (F1)^{N04}	20	mg/kg	< 20	< 20
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5
Benzo(b&j)fluoranthene^{N07}	0.5	mg/kg	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**QA03** **Soil** **S16-De04210** **Nov 30, 2016**	**QA04** **Soil** **S16-De04211** **Dec 01, 2016**
Polycyclic Aromatic Hydrocarbons				
Naphthalene	0.5	mg/kg	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	79	79
p-Terphenyl-d14 (surr.)	1	%	91	92
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
TRH >C10-C16	50	mg/kg	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100
PFOS/PFOA/6:2FTS				
Perfluorooctanesulfonic acid (PFOS)	0.005	mg/kg	< 0.005	< 0.005
Perfluorooctanoic acid (PFOA)	0.005	mg/kg	< 0.005	< 0.005
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.01	mg/kg	< 0.01	< 0.01
13C-PFHxA (surr.)	1	%	106	115
13C8-PFOS (surr.)	1	%	115	115
Heavy Metals				
Arsenic	2	mg/kg	5.8	2.8
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	30	17
Copper	5	mg/kg	9.2	8.8
Lead	5	mg/kg	20	11
Mercury	0.1	mg/kg	< 0.1	< 0.1
Nickel	5	mg/kg	7.5	12
Zinc	5	mg/kg	9.5	31
% Moisture	1	%	15	17

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	Sydney	Dec 09, 2016	14 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
BTEX	Sydney	Dec 09, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Dec 09, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Sydney	Dec 09, 2016	14 Day
- Method: E007 Polyaromatic Hydrocarbons (PAH)			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Dec 09, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Metals M8	Sydney	Dec 09, 2016	28 Day
- Method: LTM-MET-3040_R0 TOTAL AND DISSOLVED METALS AND MERCURY IN WATERS BY ICP-MS			
PFOS/PFOA/6:2FTS	Brisbane	Dec 08, 2016	14 Day
- Method: LTM-ORG-2100 Analysis of PFCs in environmental samples by LC-MS/MS			
% Moisture	Sydney	Dec 05, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: ARMIDALE
Project ID: 21-25583-04

Order No.:
Report #: 526327
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Dec 5, 2016 1:50 PM
Due: Dec 12, 2016
Priority: 5 Day
Contact Name: Ben Anderson

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						PFOS/PFOA/6:2FTS	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217							X	X
Brisbane Laboratory - NATA Site # 20794						X		
Perth Laboratory - NATA Site # 18217								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QA03	Nov 30, 2016		Soil	S16-De04210	X	X	X
2	QA04	Dec 01, 2016		Soil	S16-De04211	X	X	X
Test Counts						2	2	2

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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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
TEQ	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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
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	
Method Blank							
BTEX							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
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	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
PFOS/PFOA/6:2FTS							
Perfluorooctanesulfonic acid (PFOS)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/kg	< 0.01			0.01	Pass	
Method Blank							
Heavy Metals							
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	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	82			70-130	Pass	
TRH C10-C14	%	73			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	101			70-130	Pass	
Toluene	%	85			70-130	Pass	
Ethylbenzene	%	83			70-130	Pass	
m&p-Xylenes	%	87			70-130	Pass	
o-Xylene	%	85			70-130	Pass	
Xylenes - Total	%	86			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	97			70-130	Pass	
TRH C6-C10	%	77			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	100			70-130	Pass	
Acenaphthylene	%	90			70-130	Pass	
Anthracene	%	106			70-130	Pass	
Benz(a)anthracene	%	102			70-130	Pass	
Benzo(a)pyrene	%	101			70-130	Pass	
Benzo(b&j)fluoranthene	%	94			70-130	Pass	
Benzo(g.h.i)perylene	%	97			70-130	Pass	
Benzo(k)fluoranthene	%	107			70-130	Pass	
Chrysene	%	110			70-130	Pass	
Dibenz(a.h)anthracene	%	90			70-130	Pass	
Fluoranthene	%	102			70-130	Pass	
Fluorene	%	94			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	93			70-130	Pass	
Naphthalene	%	107			70-130	Pass	
Phenanthrene	%	99			70-130	Pass	
Pyrene	%	102			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	70			70-130	Pass	
LCS - % Recovery							
PFOS/PFOA/6:2FTS							
Perfluorooctanesulfonic acid (PFOS)	%	74			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	86			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	85			50-150	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	97			70-130	Pass	
Cadmium	%	96			70-130	Pass	
Chromium	%	99			70-130	Pass	
Copper	%	98			70-130	Pass	
Lead	%	100			70-130	Pass	
Mercury	%	105			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel			%	97			70-130	Pass	
Zinc			%	98			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S16-De03976	NCP	%	75			70-130	Pass	
TRH C10-C14	S16-De06163	NCP	%	79			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S16-De03976	NCP	%	104			70-130	Pass	
Toluene	S16-De03976	NCP	%	85			70-130	Pass	
Ethylbenzene	S16-De03976	NCP	%	80			70-130	Pass	
m&p-Xylenes	S16-De03976	NCP	%	81			70-130	Pass	
o-Xylene	S16-De03976	NCP	%	81			70-130	Pass	
Xylenes - Total	S16-De03976	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S16-De03976	NCP	%	88			70-130	Pass	
TRH C6-C10	S16-De03976	NCP	%	70			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S16-De10172	NCP	%	90			70-130	Pass	
Acenaphthylene	S16-De10172	NCP	%	90			70-130	Pass	
Anthracene	S16-De10172	NCP	%	94			70-130	Pass	
Benz(a)anthracene	S16-De10172	NCP	%	101			70-130	Pass	
Benzo(a)pyrene	S16-De10172	NCP	%	96			70-130	Pass	
Benzo(b&j)fluoranthene	S16-De10172	NCP	%	94			70-130	Pass	
Benzo(g.h.i)perylene	S16-De10172	NCP	%	97			70-130	Pass	
Benzo(k)fluoranthene	S16-De10172	NCP	%	89			70-130	Pass	
Chrysene	S16-De10172	NCP	%	91			70-130	Pass	
Dibenz(a.h)anthracene	S16-De10172	NCP	%	95			70-130	Pass	
Fluoranthene	S16-De10172	NCP	%	98			70-130	Pass	
Fluorene	S16-De10172	NCP	%	90			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S16-De10172	NCP	%	94			70-130	Pass	
Naphthalene	S16-De10172	NCP	%	90			70-130	Pass	
Phenanthrene	S16-De10172	NCP	%	90			70-130	Pass	
Pyrene	S16-De10172	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S16-De06163	NCP	%	79			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S16-De03978	NCP	%	121			70-130	Pass	
Cadmium	S16-De08456	NCP	%	99			70-130	Pass	
Chromium	S16-De08456	NCP	%	85			70-130	Pass	
Copper	S16-De08456	NCP	%	105			70-130	Pass	
Lead	S16-De08456	NCP	%	96			70-130	Pass	
Mercury	S16-De08456	NCP	%	106			70-130	Pass	
Nickel	S16-De08456	NCP	%	97			70-130	Pass	
Zinc	S16-De08456	NCP	%	92			70-130	Pass	
Spike - % Recovery									
PFOS/PFOA/6:2FTS				Result 1					
Perfluorooctanesulfonic acid (PFOS)	S16-De04211	CP	%	75			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanoic acid (PFOA)	S16-De04211	CP	%	78			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De04211	CP	%	76			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S16-De03965	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	B16-De05038	NCP	mg/kg		< 20	<1	30%	Pass	
TRH C15-C28	B16-De05028	NCP	mg/kg		< 50	<1	30%	Pass	
TRH C29-C36	B16-De05028	NCP	mg/kg		< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S16-De03965	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S16-De03965	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S16-De03965	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S16-De03965	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S16-De03965	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S16-De03965	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-De03965	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S16-De03965	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S16-De10181	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	B16-De05038	NCP	mg/kg		< 50	<1	30%	Pass	
TRH >C16-C34	B16-De05028	NCP	mg/kg		< 100	<1	30%	Pass	
TRH >C34-C40	B16-De05028	NCP	mg/kg		< 100	<1	30%	Pass	
Duplicate									
PFOS/PFOA/6:2FTS				Result 1	Result 2	RPD			
Perfluorooctanesulfonic acid (PFOS)	S16-De04210	CP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S16-De04210	CP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De04210	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S16-De04733	NCP	mg/kg	4.3	3.7	16	30%	Pass	
Cadmium	S16-De04733	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S16-De04733	NCP	mg/kg	14	13	6.0	30%	Pass	
Copper	S16-De04733	NCP	mg/kg	16	17	4.0	30%	Pass	
Lead	S16-De04733	NCP	mg/kg	11	9.4	12	30%	Pass	
Mercury	S16-De04733	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S16-De04733	NCP	mg/kg	13	12	6.0	30%	Pass	
Zinc	S16-De04733	NCP	mg/kg	23	21	7.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
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

Authorised By

Nibha Vaidya	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)
Ryan Hamilton	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Inorganic (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.

eurofins | mgt

☑ **Sydney**
Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
Phone: +612 9900 8400
Email: enviro.syd@mgtlabmark.com.au

☐ **Brisbane**
Unit 1-21 Smallwood Place, Murrarie
Phone: +617 3902 4600
Email: enviro.bris@mgtlabmark.com.au

☐ **Melbourne**
2 Kingston Town Close, Oakleigh, VIC 3166
Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Page 1 of 1

Company Name : GHD Pty Ltd, Sydney
Contact Name : Terry Nham
Purchase Order :
COC Number :
Office Address : Level 15, 133 Castlereagh Street, Sydney NSW 2000
Project Manager : Ben Anderson
PROJECT Number : 21-25583-04
Eurofins | mgt quote ID : GHD Rates 2016
Email for results : terry.nham@ghd.com ben.anderson@ghd.com
PROJECT Name : Armidale
Data output format: ESDAT

Special Directions & Comments :

Eurofins | mgt DI water batch number:

Analytes

	Sample ID	Date	Matrix	PFOS/PFOA	TRH, BTEX, PAH, 8M (Suite B7)
1	QA102	8/12/16	Water	X	X
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Some common holding times (with correct preservation).
For further information contact the lab

Waters		**Soils**	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14
Heavy Metals	6 months	Heavy Metals	6
Mercury, CrVI	28 days	Mercury, CrVI	28
Microbiological testing	24 hours	Microbiological testing	72
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24
Ferrous iron	7 days	ASLP, TCLP	7

Containers:

1LP	250P	60P	500A	40mL vial	125mL A	Jar	Bag	Sample comment
		1	2	2	1			

Relinquished By: Terry Nham - GHD
Date & Time : 12/12/2016
Signature:

Laboratory Staff
Received By: [illegible]
Date & Time : 13/12/16 1225
Signature:

Turn around time
1 DAY ☐ 2 DAY ☐ 3 DAY ☐
5 DAY ☑ 10 DAY ☐ Other:

Method Of Shipment
☐ Courier
☑ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arriva

Report number: 52761

QS3009_R0 Issue Date: 25 February 2013 Page 1 of 1

Certificate of Analysis

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.

WORLD RECOGNISED ACCREDITATION

GHD Pty Ltd NSW
Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Attention: **Terry Nham**

Report **527617-W**
Project name ARMIDALE
Project ID 21-25583-04
Received Date Dec 13, 2016

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**QA102** **Water** **S16-De14029** **Dec 08, 2016**
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene^{N02}	0.01	mg/L	< 0.01
TRH >C10-C16 less Naphthalene (F2)^{N01}	0.05	mg/L	< 0.05
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)^{N04}	0.02	mg/L	< 0.02
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.001	mg/L	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001
Anthracene	0.001	mg/L	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001
Benzo(b&j)fluoranthene^{N07}	0.001	mg/L	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001
Chrysene	0.001	mg/L	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001
Fluoranthene	0.001	mg/L	< 0.001
Fluorene	0.001	mg/L	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001
Naphthalene	0.001	mg/L	< 0.001
Phenanthrene	0.001	mg/L	< 0.001
Pyrene	0.001	mg/L	< 0.001

Client Sample ID			**QA102**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-De14029**
Date Sampled			**Dec 08, 2016**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Total PAH*	0.001	mg/L	< 0.001
2-Fluorobiphenyl (surr.)	1	%	52
p-Terphenyl-d14 (surr.)	1	%	64
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluorobutanesulfonic acid (PFBS)	0.00001	mg/L	0.00017
Perfluorobutanoic acid (PFBA)	0.00005	mg/L	0.00014
Perfluorohexanesulfonic acid (PFHxS)	0.00001	mg/L	^{N09}0.00021
Perfluorooctanesulfonic acid (PFOS)	0.00001	mg/L	^{N09}0.00025
Perfluorodecanesulfonic acid (PFDS)	0.00001	mg/L	< 0.00001
Perfluoropentanoic acid (PFPeA)	0.00001	mg/L	^{N09}0.00028
Perfluorohexanoic acid (PFHxA)	0.00001	mg/L	^{N09}0.00048
Perfluoroheptanoic acid (PFHpA)	0.00001	mg/L	^{N09}0.00004
Perfluorooctanoic acid (PFOA)	0.00001	mg/L	^{N09}0.00003
Perfluorononanoic acid (PFNA)	0.00001	mg/L	< 0.00001
Perfluorodecanoic acid (PFDA)	0.00001	mg/L	< 0.00001
Perfluoroundecanoic acid (PFUnA)	0.00001	mg/L	< 0.00001
Perfluorododecanoic acid (PFDoA)	0.00001	mg/L	< 0.00001
Perfluorotridecanoic acid (PFTrDA)	0.00001	mg/L	< 0.00001
Perfluorotetradecanoic acid (PFTeDA)	0.00001	mg/L	< 0.00001
Perfluorooctanesulfonamide (PFOSA)	0.00005	mg/L	< 0.00005
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.00005	mg/L	< 0.00005
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.00005	mg/L	< 0.00005
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.00001	mg/L	< 0.00001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.00005	mg/L	< 0.00005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.00001	mg/L	< 0.00001
d5-n-EtFOSAA (surr.)	1	%	28
13C-PFHxA (surr.)	1	%	61
13C8-PFOS (surr.)	1	%	45
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	0.003
Lead (filtered)	0.001	mg/L	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.010
Zinc (filtered)	0.005	mg/L	0.041

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	Melbourne	Dec 16, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 13, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 16, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX	Sydney	Dec 13, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Melbourne	Dec 16, 2016	7 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Dec 16, 2016	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Metals M8 filtered	Sydney	Dec 15, 2016	28 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: ARMIDALE
Project ID: 21-25583-04

Order No.:
Report #: 527617
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Dec 13, 2016 12:25 PM
Due: Dec 20, 2016
Priority: 5 Day
Contact Name: Terry Nham

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Polycyclic Aromatic Hydrocarbons	Metals M8	BTEX	Per- and Polyfluorinated Alkyl Substances (PFASs)	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271						X				X
Sydney Laboratory - NATA Site # 18217							X	X		X
Brisbane Laboratory - NATA Site # 20794									X	
Perth Laboratory - NATA Site # 18217										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	QA102	Dec 08, 2016		Water	S16-De14029	X	X	X	X	X
Test Counts						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

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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
TEQ	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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorobutanoic acid (PFBA)	mg/L	< 0.00005			0.00005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/L	< 0.00001			0.00001	Pass	
Perfluoropentanoic acid (PFPeA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorohexanoic acid (PFHxA)	mg/L	< 0.00001			0.00001	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanoic acid (PFOA)	mg/L	< 0.00001			0.00001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorononanoic acid (PFNA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorodecanoic acid (PFDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorododecanoic acid (PFDoA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/L	< 0.00005			0.00005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/L	< 0.00005			0.00005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/L	< 0.00005			0.00005	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/L	< 0.00001			0.00001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/L	< 0.00005			0.00005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/L	< 0.00001			0.00001	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	106			70-130	Pass	
TRH C10-C14	%	73			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	106			70-130	Pass	
Toluene	%	109			70-130	Pass	
Ethylbenzene	%	109			70-130	Pass	
m&p-Xylenes	%	119			70-130	Pass	
o-Xylene	%	112			70-130	Pass	
Xylenes - Total	%	117			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	104			70-130	Pass	
TRH C6-C10	%	102			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	99			70-130	Pass	
Acenaphthylene	%	99			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	113			70-130	Pass	
Benzo(a)pyrene	%	110			70-130	Pass	
Benzo(b&j)fluoranthene	%	103			70-130	Pass	
Benzo(g.h.i)perylene	%	101			70-130	Pass	
Benzo(k)fluoranthene	%	117			70-130	Pass	
Chrysene	%	112			70-130	Pass	
Dibenz(a.h)anthracene	%	121			70-130	Pass	
Fluoranthene	%	104			70-130	Pass	
Fluorene	%	102			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	109			70-130	Pass	
Naphthalene	%	95			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenanthrene	%	104			70-130	Pass	
Pyrene	%	105			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	70			70-130	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	85			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	131			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	81			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	76			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	52			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	70			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	80			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	81			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	76			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	86			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	69			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	55			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	51			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	53			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	55			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	57			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	115			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	59			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	67			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	65			50-150	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	112			70-130	Pass	
Cadmium (filtered)	%	81			70-130	Pass	
Chromium (filtered)	%	112			70-130	Pass	
Copper (filtered)	%	112			70-130	Pass	
Lead (filtered)	%	108			70-130	Pass	
Mercury (filtered)	%	107			70-130	Pass	
Nickel (filtered)	%	113			70-130	Pass	
Zinc (filtered)	%	112			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S16-De12416	NCP	%	96			70-130	Pass	
TRH C10-C14	M16-De10576	NCP	%	97			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S16-De12416	NCP	%	115			70-130	Pass	
Toluene	S16-De12416	NCP	%	119			70-130	Pass	
Ethylbenzene	S16-De12416	NCP	%	118			70-130	Pass	
m&p-Xylenes	S16-De12416	NCP	%	130			70-130	Pass	
o-Xylene	S16-De12416	NCP	%	123			70-130	Pass	
Xylenes - Total	S16-De12416	NCP	%	127			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S16-De12416	NCP	%	102			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C6-C10	S16-De12416	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M16-De15982	NCP	%	110			70-130	Pass	
Acenaphthylene	M16-De15982	NCP	%	130			70-130	Pass	
Anthracene	M16-De15982	NCP	%	127			70-130	Pass	
Benz(a)anthracene	M16-De15982	NCP	%	104			70-130	Pass	
Benzo(a)pyrene	M16-De15982	NCP	%	124			70-130	Pass	
Benzo(b&j)fluoranthene	M16-De15982	NCP	%	121			70-130	Pass	
Benzo(g.h.i)perylene	M16-De15982	NCP	%	112			70-130	Pass	
Benzo(k)fluoranthene	M16-De15982	NCP	%	124			70-130	Pass	
Chrysene	M16-De15982	NCP	%	106			70-130	Pass	
Dibenz(a.h)anthracene	M16-De15982	NCP	%	115			70-130	Pass	
Fluoranthene	M16-De15982	NCP	%	98			70-130	Pass	
Fluorene	M16-De15982	NCP	%	120			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M16-De15982	NCP	%	109			70-130	Pass	
Naphthalene	M16-De15982	NCP	%	89			70-130	Pass	
Phenanthrene	M16-De15982	NCP	%	125			70-130	Pass	
Pyrene	M16-De15982	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-De10576	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B16-De18786	NCP	%	85			50-150	Pass	
Perfluorobutanoic acid (PFBA)	B16-De18786	NCP	%	112			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-De18786	NCP	%	74			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-De18786	NCP	%	128			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-De18786	NCP	%	51			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B16-De18786	NCP	%	76			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B16-De18786	NCP	%	84			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-De18786	NCP	%	88			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B16-De18786	NCP	%	112			50-150	Pass	
Perfluorononanoic acid (PFNA)	B16-De18786	NCP	%	83			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B16-De18786	NCP	%	71			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-De18786	NCP	%	60			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	B16-De18786	NCP	%	58			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-De18786	NCP	%	53			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B16-De18786	NCP	%	53			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-De18786	NCP	%	54			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-De18786	NCP	%	113			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-De18786	NCP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-De18786	NCP	%	62			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-De18786	NCP	%	115			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)	B16-De18786	NCP	%	63			50-150	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S16-De14029	CP	%	113			70-130	Pass	
Cadmium (filtered)	S16-De14029	CP	%	86			70-130	Pass	
Chromium (filtered)	S16-De14029	CP	%	115			70-130	Pass	
Copper (filtered)	S16-De14029	CP	%	96			70-130	Pass	
Lead (filtered)	S16-De14029	CP	%	86			70-130	Pass	
Mercury (filtered)	S16-De14029	CP	%	95			70-130	Pass	
Nickel (filtered)	S16-De14029	CP	%	108			70-130	Pass	
Zinc (filtered)	S16-De14029	CP	%	108			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S16-De12415	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	S16-De15297	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	S16-De15297	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	S16-De15297	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S16-De12415	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S16-De12415	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S16-De12415	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S16-De12415	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S16-De12415	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S16-De12415	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-De12415	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S16-De12415	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g.h.i)perylene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	M16-De13811	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S16-De15297	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	S16-De15297	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	S16-De15297	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S16-De14029	CP	mg/L	0.00017	0.00017	3.0	30%	Pass	
Perfluorobutanoic acid (PFBA)	S16-De14029	CP	mg/L	0.00014	0.00015	4.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-De14029	CP	mg/L	0.00021	0.00022	2.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-De14029	CP	mg/L	0.00025	0.00022	10	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S16-De14029	CP	mg/L	0.00028	0.00030	7.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S16-De14029	CP	mg/L	0.00048	0.00047	3.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-De14029	CP	mg/L	0.00004	0.00005	13	30%	Pass	
Perfluorooctanoic acid (PFOA)	S16-De14029	CP	mg/L	0.00003	0.00003	2.0	30%	Pass	
Perfluorononanoic acid (PFNA)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanesulfonamide (PFOSA)	S16-De14029	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-De14029	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-De14029	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De14029	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-De14029	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S16-De14127	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	S16-De14127	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S16-De14127	NCP	mg/L	0.001	0.001	4.0	30%	Pass	
Copper (filtered)	S16-De14127	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel (filtered)	S16-De14127	NCP	mg/L	0.006	0.006	<1	30%	Pass	
Zinc (filtered)	S16-De14127	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
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
Alex Petridis	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)
Joseph Edouard	Senior Analyst-Organic (VIC)
Ryan Hamilton	Senior Analyst-Metal (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.

Appendix F – 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
Precision		
Inter/ intra duplicates	1 / 10 samples	<30-50% RPD
Accuracy		
Surrogate spikes Laboratory control samples Matrix spikes	All organic samples 1 per lab batch 1 per lab batch	70-130% <LOR 70-130%
Representativeness		
Sampling appropriate for media and analytes	All samples	- Organics (7-14 days)

Data quality indicator	Frequency	Data quality acceptance criteria
Samples extracted and analysed within holding times	All samples	Inorganics (6 months) Some exceptions to these holding times are listed below (^{1})
LORs appropriate and consistent	All samples	All samples
Comparability		
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
Completeness		
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
Acronyms COC: Chain of Custody LOR: Limit of Reporting QA/QC: Quality assurance / quality control		

[1] 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 H
- 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.
  - 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. 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	2	35	39
Inter	1/10 samples		2		
Intra	1/10 samples	Water	1	13	15
Inter	1/10 samples		1		
Intra	1/10 samples	Sediment	1	17	18

All quality control sampling frequency criteria were met during this investigation.

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
SB01_0.5-0.6	Intra	ES1627710005	QA02	30/11/2016	ES1627710	Soil
SB09_0.9-1.0	Intra	ES1627710027	QA06	1/12/2016	ES1627710	Soil
SB03_0.9-1.0	Inter	S16-De04210	QA03	30/11/2016	526329	Soil
SB06_0.4-0.5	Inter	S16-De04211	QA04	1/12/2016	526329	Soil
SS09	Intra	ES1627710035	QA01	28/11/2016	ES1627710	Sediment
SW02	Intra	ES1627710040	QA101	28/11/2016	ES1627710	Surface water
MW01	Inter	S16-De14029	QA102	8/12/2016	527617	Ground water

RPD exceedances were reported during this investigation.

QA02 – Primary sample SB01_0.5-0.6 - Perfluoropentanoic acid 53%

QA01 – Primary sample SS09 - Perfluorooctane sulfonic acid (PFOS) 103%

QA03 – Primary sample SB03_0.9-1.0 – Nickel 46%

QA04 – Primary sample SB06_0.4-0.5 – Chromium 67%
Nickel 40%
Zinc 30%

QA101 – Primary sample SW02 – Copper 67%

Nikel 67%

QA102 – Primary sample MW01 - Perfluorobutane sulfonic acid 30%

Perfluorohexane sulfonic acid (PFHxS) 42%

Perfluoropentanoic acid 33%

Perfluorobutanoic acid 33%

Perfluoroheptanoic acid 40%

Perfluorohexanoic acid (PFHxA) 31%

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

All laboratory RPDs, matrix spike, LCSs and method blanks were within the ALS acceptable ranges.

Table 5 Outliers: Frequency of Quality Control Samples – six analytes

Laboratory report	Quality Control Sample	Analytes	Sample Code	results	Comment
ES1627706	Matrix Spike	sulfate	ES1627505-001	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Frequency of quality control samples	6			
ES1627710	Matrix Spike	Perfluorooctane sulfonic acid (PFOS)	ES1627710-001	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Matrix Spike	Sulfate	ES1627505-001	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Frequency of quality control samples	6			
ES1628450	Laboratory control samples	Total organic carbon	QC-689656-002	100%	Recovery greater than upper control limit
	Matrix Spike	Total organic carbon	ES1628450-012	not determined	MS recovery not determined, background level greater than or equal to 4x spike level

Laboratory report	Quality Control Sample	Analytes	Sample Code	results	Comment
	Matrix Spike	Perfluorooctane sulfonic acid (PFOS)	ES1628450-010	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Matrix Spike	Suplhate	ES1628450-001	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Frequency of quality control samples	7			

Sample holding times

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

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.

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 – Survey Results

LISCAD Report: Point Report

File: 11828 well pickup
Projection: Map Grid Australia 94 Zone 56
File Date: 3 February, 2017
Surveyor: James Spagnolo

Distance Units: Metres

AHD And MGA Benchmark - PM55683 - LOCATED INTERSECTION OF MOSSMAN STREET & COOKES ROAD

BENCHMARK	EASTING	NORTHING	R.L. (A.H.D.)
PM55683	373493.044	6622019.18	992.304

Monitoring Well No.	TOP OF CASING - EASTING	TOP OF CASING - NORTHING	R.L. TOP OF CASING (AHD)	R.L. TOP OF GATIC (AHD)
MW01	373885.480	6622074.289	983.876	983.777
MW02	373964.491	6621966.098	985.469	985.425
MW03	373922.110	6622107.760	982.440	982.371
MW04	373997.100	6622089.366	983.013 (top of monument)	982.921

Appendix H – Equipment calibration certificates

2/11/2016

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-105905

airmet

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	✓	
	Settings	✓	
Software	Version	✓	
Data logger	Operation	✓	
Download	Operation	✓	
Other tests:			

Low	High	TWA	STEL
50ppm	100ppm	N/A	N/A

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		98.2ppm

Calibrated by: Joanna Wong

Calibration date: 2/11/2016

Next calibration due: 2/12/2016

Air-Met Scientific Pty Ltd
1300 137 067

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 13C100781

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		291176	pH 9.54
2. pH 7.00		pH 7.00		288773	pH 6.89
3. pH 4.00		pH 4.00		288994	pH 4.00
4. mV		231.8mV		OB1388/OB1390	231.7mV
5. EC		2.76mS		290786	2.76mS
6. D.O		0.00ppm		4347	0.00ppm
7. Temp		21.0°C		MultiTherm	21.0°C

Calibrated by: Joanna Wong

Calibration date: 24/11/2016

Next calibration due: 24/12/2016

21/11/2016

Oil / Water Interface Meter

Instrument Geotech Interface Meter (30M)
Serial No. 4063

Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Calibrated by: Meixi Huo

Calibration date: 21/11/2016

Next calibration due: 20/01/2017

GHD

133 Castlereagh St Sydney NSW 2000
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T: +61 2 9239 7100   F: +61 2 9239 7199   E: sydmail@ghd.com.au

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	N Rosen A Walker	J Hallchurch		J Hallchurch		23/02/2017
0	N. Rosen	J Hallchurch	JHallchurch	J Hallchurch	JHallchurch	27/04/2017

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