Fire & Rescue NSW

Greenacre 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 - Greenacre Facility Environmental Site Assessment - PFAS Addendum 1

1 Introduction

Between November and January 2017, GHD completed a combined preliminary and detailed site investigation at the Greenacre Facility located at 1 and 1A Amarina Avenue, Greenacre, NSW 2190 (the site). The site is owned and operated by FRNSW, comprising a warehouse and mechanical workshop. Site activities included testing of fire trucks during routine maintenance works, potentially including 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 – Greenacre 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.

GHD Pty Ltd ABN 39 008 488 373
Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia
T 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

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.

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

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

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

Table 1 Screening level comparison

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

[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*

Table 2 Interim data review

Summary information	Groundwater Data	Surface Water Data
Number of samples collected	Two groundwater samples were collected from on site locations (MW01 and MW02).	Three surface water samples (SW01 to SW03) were collected from on-site drainage lines and surface water collection points. One tank water (FW01) was collected the recycle water tank.
Review of data for protection of drinking water quality	One groundwater sample (MW01) reported a concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of drinking water quality. One location (MW01) reported a concentration of PFOA above the FSANZ (2017) screening value for the protection of drinking water quality.	All surface water samples and tank water sample reported concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of drinking water quality. Two locations (SW01 and SW02) reported concentrations of PFOA above the FSANZ (2017) screening value for the protection of drinking water quality.
Review of data for protection of recreational water quality	One groundwater sample (MW01) reported a concentration of PFOS/PFHxS in groundwater above the FSANZ (2017) screening value for the protection of recreational water quality. One location (MW01) reported a concentration of PFOA above the FSANZ (2017) screening value for the protection of recreational water quality.	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):

- MW01 previously reported concentrations of PFOS / PFHxS above the enHealth (2016) screening levels for the protection of drinking water or recreational water quality. Application of the revised FSANZ (2017) guidelines does not have any impact on the overall interpretation of the data or conceptual site model evaluating contaminant source – pathway – receptor relationships.
- All surface water samples previously reported concentrations of PFOS / PFHxS above the enHealth (2016) screening levels for the protection of drinking water or recreational water quality. Application of the revised FSANZ (2017) guidelines does not have any impact on the overall interpretation of the data or conceptual site model evaluating contaminant source – pathway – receptor relationships.

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

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 2 of DP588394 and Lot 1 DP 193478 located at 1 and 1A Amarina Avenue, Greenacre NSW 2190 (the 'site').

The site is owned and operated by FRNSW, comprising a warehouse and mechanical workshop. Site activities included testing of fire trucks during maintenance works, potentially including the use of aqueous film forming foams (AFFF). The foams historically used on site may have contained perfluoro alkyl substances (PFASs) including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

The site area is located within a primarily commercial and industrial setting, bound by industrial warehouses with Amarina Avenue to the west and Wentworth road to the east.

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) at the site.

The scope of work comprised:

- Drilling and installation of two groundwater monitoring wells (MW01 and MW02) and one soil bore (SB01).
- Collection of two sediment samples (SS02 and SS03) and four surface water samples (SW01, SW02, SW03 and FW01) including collection of one water sample from recycled water collected from fire trucks stored on site (FW01) and analysis for PFAS.
- A groundwater monitoring event (GME) of the two new groundwater wells
- 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), total organic carbon (TOC), cation exchange capacity (CEC), and pH in soils and sediments.
  - PFAS, TRH, BTEX, PAH and heavy metals (standard laboratory limit of reporting), major ions, pH and alkalinity and total dissolved solids (TDS) in surface water and groundwater.
- Laboratory analysis of a retrieved section of concrete from SB01 and MW02 for PFAS
- 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:

- Soil, sediment, surface water and groundwater samples were collected from areas of potential concern. Two groundwater wells were installed on site. All sampling was limited to on-site and no off-site samples were collected as part of this preliminary stage of works.
- Laboratory analyses indicate the presence of PFAS in all media sampled (soils, sediment, soil and sediment leachate, surface water and groundwater) and a number of locations

report concentrations above the relevant screening criteria for the protection of human health and/ or ecological receptors.

- Impacted concrete, soil and sediments may continue to act as a source of PFAS to surface and groundwater receptors.
- Elevated PFAS concentrations were reported in one on-site groundwater well (MW01). The extent and source of this impact is not fully understood and further investigation is required to understand the extent of impact including off-site migration.
- Surface water samples collected from stormwater drains indicate PFAS impacted surface water (and possibly sediments) is migrating off-site via the drain in the north-east corner of the site and via the site interceptor.
- Elevated concentrations of heavy fraction hydrocarbons were reported in surface water collected from the drain within the main warehouse (SW02). A corresponding increase was noted in sediment samples collected from the same location. Whilst it is acknowledge that this drain leads to the oil/water interceptor on-site, the presence of hydrocarbon impact within the main warehouse is noted and further recommendations for management of this issue are provided in Section 9.2.

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:

- Consider immediate management actions that can be implemented on-site to restrict the flow of PFAS to off-site receptors. This could include removing concrete and shallow soils around MW02 and at SB01 to prevent further leaching of PFAS to the surrounding media (including deeper soils and groundwater). Sediments should be cleared out of all drainage systems in the main warehouse and along the eastern site boundary as a precautionary measure
  - GHD acknowledges that the volume of sediment from the site is likely to be small and is therefore unlikely to represent a substantial risk to on site and off site receptors. Clearing out drainage lines is a precautionary measure, however consideration could also be given to monitoring sediment transport volumes through the drainage network. Clearing out the drainage lines in the main warehouse will also help address the hydrocarbon impact noted in sediment sample SS02.
  - It is likely that the site interceptor has trapped PFAS contaminated sediments. FRNSW should also consider clearing out the interceptor in conjunction with the drainage channels in the main warehouse.
  - The extent of the source zones in the concrete and shallow soils is not well understood. Further assessment should be conducted to adequately delineate the area of historic AFFF use on site and towards the site boundary.
- Further assessment to understand the source of PFAS contamination in groundwater at MW01 and likelihood of off-site impact. Delineation of groundwater impact is required to adequately understand groundwater flow directions and the possible sources of PFAS impact at this monitoring location. Future sampling events should include re-sampling of locations MW01 and MW02 (plus any subsequent monitoring bores) to better understand the extent of PFAS contamination in the groundwater and validate the results of this stage of assessment.
- Survey of surface water flows to better understand the drainage pathways throughout the site and likely migration pathways for PFAS. Additionally, assess where water flowing off-site discharges to after flowing through both the site interceptor and the storm water drain on the north-east corner of the site. The aim of these works would be to better understand

the likely receptors at the point of discharge. Further sampling should be conducted at the point of discharge to delineate PFAS contamination off-site and to evaluate the risk to the identified off-site receptors.

- Review of the on-site management practices of hydrocarbons in the drainage system through the main warehouse. Ensure the relevant environmental management plans are in place and align to industry standards for handling and storage of hydrocarbons.
- Additional sampling following source removal works (both PFAS and TRH) to evaluate the effectiveness of these management actions. Sampling should consider seasonal fluctuations and rainfall events to gain sufficient data to appropriately evaluate the risks to possible sensitive receptors.
- Additional sampling to further understand the extent of impact, in particular focusing on characterisation of off-site migration and the lateral extent of PFAS impact.
- Further information is required on the decommissioned fuel infrastructure including any reports and environmental investigations that may have been undertaken.

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
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
SWL	Standing water level

Abbreviation	Description
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

Table of contents

Table index

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 2 of DP588394 and Lot 1 DP 193478 located at 1 and 1A Amarina Avenue, Greenacre NSW 2190 (the 'site').

The site is owned and operated by FRNSW, comprising a warehouse and mechanical workshop. Site activities included testing of fire trucks during maintenance works, potentially including the use of aqueous film forming foams (AFFF). The foams historically used on site may have contained perfluoro alkyl substances (PFASs) including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

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

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

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

1.1 Background

The site area is approximately 23,550 m^2 and comprises Lot 1 DP 193478 and Lot 2 of DP588394. The approximate site boundaries are presented in Figure 1, Appendix A.

The site is owned and operated by FRNSW for use as storage, office and mechanical workshop and outfitting. The site area is located with a primarily commercial and industrial setting, bound by industrial warehouses with Amarina Avenue to the west and Wentworth road to the east.

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 the EPA has identified impact in surface water down gradient of the site 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) at the site.

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 two groundwater monitoring wells (MW01 and MW02) and one soil bore (SB01).
- Collection of two sediment samples (SS02 and SS03) and four surface water samples (SW01, SW02, SW03 and FW01) including collection of one water sample from recycled water collected from fire trucks stored on site (FW01) and analysis for PFAS.
- A groundwater monitoring event (GME) of the two new groundwater wells
- 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), total organic carbon (TOC), cation exchange capacity (CEC), and pH in soils and sediments.
  - PFAS, TRH, BTEX, PAH and heavy metals (standard laboratory limit of reporting), major ions, pH and alkalinity and total dissolved solids (TDS) in surface water and groundwater.
- Laboratory analysis of a retrieved section of concrete from SB01 and MW02 for PFAS
- Laboratory analysis of a selection of soil samples for Australian standard leaching procedure (ASLP)
- A quality control and quality assurance (QA/QC) program
- Surveying of newly installed wells
- Preparation of this environmental site assessment 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 site identification details is provided in Table 2-1. The site location is presented in Figure 1 in Appendix A.

Table 2-1 Site identification summary

Information	Details
Street Address	1 and 1A Amarina Avenue, Greenacre NSW 2190
Lot and DP number	Lot 1 DP 193478 and Lot 2 of DP588394
Site Area	23 550 m2
Local Government Area	Strathfield Municipal Council
Local Land Use Zoning	IN1 – General Industrial
Current Land Use	Mechanical workshop, mechanical fit out and offices (new FRNSW headquarters under construction).

2.2 Surrounding land use and zoning

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

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

Orientation	Description of Surrounding Land Use	Zoning (Strathfield LEP 2012)
North	Industrial area (Goodman Chullora distribution centre)	IN1 – General residential
East	Older industrial ware houses followed by Wentworth street and a rail corridor	IN1 – General residential Followed by SP2 - infrastructure
South	Industrial/commercial warehouses including a Bunnings centre and Toll depot	IN1 – General residential
West	Commercial area (including Greenacre Officeworks, a Caltex service station and carpark area) followed by Roberts Road)	IN1 – General residential Followed by SP2 - infrastructure

2.3 Site environmental setting

2.3.1 Topography

The site lies at approximately 25 m Australian Height Datum (AHD), according to *NSW Globe* from Land and Property Information. The regional topography appears to fall to the east from the site towards Wentworth Street.

The site is generally flat, with a high point on the south-east corner of the site and over to the site entrance at Amarina Avenue. The site surface has been artificially graded to aid surface/storm water flow directions.

2.3.2 Soils

General

According to eSPADE from Office of Environment & Heritage, the site is located on disturbed terrain, which has the following characteristics:

- **Landscape:** level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief <10 m, slopes <30%. Landfill includes soil, rock, building and waste materials. Original vegetation completely cleared, replaced with turf or grassland.
- **Soils:** turfed fill areas commonly capped with up to 40 cm of sandy loam or up to 60 cm of compacted clay over fill or waste materials.
- **Limitations:** dependent on nature of fill material. Mass movement hazard, unconsolidated low wet strength materials, impermeable soil, poor drainage, localised very low fertility and toxic materials.

Acid Sulphate Soils

The acid sulphate soil class at the site is Class C4 (ASRIS, 2013) and the works would have extremely low probability of encountering acid sulphate containing soils. There are no other soil classes located within 500 m of the site.

2.3.3 Hydrology

The closest receiving water body is Coxs Creek, located approximately 1 km south-east of the site. This flows into Cooks River, located approximately 1.2 km east of the site. It is expected that the stormwater systems will intercept surface water flowing from the site before it reaches either of these receptors. However, stormwater drains leaving the site would potentially drain to either of these receptors. The general catchment hydrology and slope is presented in Figure 3, Appendix A.

2.3.4 Geology

The regional geology of the area is Bringelly Shale and near the interface with the Ashfield Shale that ranges in thickness from 48 to 54 metres across the Sydney area (Department of Mineral Resources and Energy 1983). The shale is underlain by Hawksbury Sandstone. This lithology is part of the Middle Triassic *Wianamatta* Group that is characteristic of shale with some sandstone beds.

Previous investigation by JK Geotechnics (2013) suggest that there is potential for some fill material to be present at the site to depths of approximately 0.85 m below ground level. The fill is underlain by sandstone. The investigation tested the soil pH for three samples, which ranged between 5.2 and 9.3, and the sulphate and chloride contents were a maximum of 210 mg/kg.

2.3.5 Hydrogeology

According to the Botany Basin Groundwater Management Map produced by the NSW Department of Primary Industries (Water), the site is within the Sydney Basin.

The site is located on Bringelly and Ashfield Shale and residual clays, which are expected to have low overall hydraulic conductivities and have low beneficial use potential from both a yield and water quality perspective. Groundwater is expected to flow predominantly along shale clay interface. The low hydraulic conductivity shales and clays present the beneath the area will limit the hydraulic connection between groundwater across the site and impede the overall movement of contaminants off-site in groundwater.

Regional groundwater flow is expected to follow the local topography and therefore drain towards Coxs Creek and the Cooks River, south-east and east of the site. However, local flow is likely to be governed by geological variations.

Existing Groundwater Bores

GHD conducted a review of existing groundwater borehole records using the NSW Department of Primary industries, Office of Water, groundwater database (February 2017). The search was conducted to identify registered groundwater boreholes in close proximity and to record information such as use and standing water level. Three groundwater boreholes were identified within a 1 kilometre radius of the site (summarised in Table 2-3), all registered for monitoring purposes. None of these groundwater boreholes are located within the site boundary. The closest groundwater bore licenced for abstraction for domestic, commercial or stock purposes was 1.7 km north-east of the site.

Details of the groundwater borehole search are presented in Appendix D.

Table 2-3 Review of existing groundwater data

Borehole ID	Purpose	Depth (m)	Standing Water Level (m)	Approx. Distance from Site	Drillers Log
GW112333	Monitoring Bore	8.63	Unknown	150 m south west	Fill underlain by shale and sandstone
GW112334	Monitoring Bore	9.00	Unknown	260 m south west	Fill underlain by silty clay, shale and sandstone
GW112335	Monitoring Bore	8.80	Unknown	160 m south	Fill underlain by silty clay, shale and sandstone

Groundwater risk map

The *1:2,000,000 Groundwater in New South Wales, Assessment of Pollution Risk Map* (1987) indicates that the site is likely underlain by shale and siltstone. It was classified as having low potential for groundwater movement and a high salinity rendering it unlikely to be suitable for stock use (i.e. > 1400 mg/L).

2.3.6 Surface water and drainage

No surface water storage ponds are present at this site, however there is a water retention tank for recycled truck water on the eastern site boundary. This tank is made of concrete and was full of water during sampling and therefore no comment can be made about the base of the tank. The tank had no visible cracks and was regarded to be in good condition. Surface water flow on site is expected to follow the local topography and flow east or north-east, or be intercepted by drainage lines located at the site (also directed to the east or north-east). Dial before you dig information showed stormwater drainage infrastructure on Wentworth Road to the east of the site. Drainage diagrams for the site provided by FRNSW showed that all stormwater drains leave the site in the north-eastern corner via stormwater.

2.4 Site layout and key site features

A site inspection was undertaken initially by GHD in July 2016. Observations made during the site inspection are presented in *Greenacre PFAS Investigation, Preliminary Site Investigation and Sampling and Analysis Quality Plan* (GHD, 2016).

Table 2-4 provides a summary of site details including site layout and key site features and are shown on Figure 2, Appendix A.

Table 2-4 Key site features

Item	Summary observations
Fencing and access	The whole site is secured by a mixture of fences and building walls. The entrance and exit to the site is from Amarina Avenue. There is a

Item	Summary observations
	boom gate and security gatehouse at this entrance/exit and general access to the site is restricted to FRNSW personnel.
FRNSW site features	Key features of the site include: - Administration buildings and site offices (including new FRNSW headwaters being constructed on the southern portion of the site) - Truck servicing area in the main warehouse/ mechanical work shop on the northern portion of the site - Truck parking along the eastern site boundary - Historical foam storage and truck wash stations (including pump pit for water from the trucks) on the eastern site boundary - The area in the south eastern corner of the site was also use to run training courses on fire extinguisher training to the public - Historical underground fuel storage tank/s that have been decommissioned located to the north of the truck wash station.
Waste drums or bulk storage facilities	Within the main warehouse on the site, there is a collection of AFFF (IBCs and 20 L concentrate) and trade waste for collection and destruction. These are stored in the western corner of the building. The AFFF is reportedly sent to the site from other FRNSW for destruction. The AFFF is incinerated off site with a destruction certificate supplied. The building used to store AFFF waste for destruction is locked over-night. All other storage area for non PFASs foam are located within a fence on hardstand with no evidence of spills noted at the time of the inspection.

3. Data Quality Objectives

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

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

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

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

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

Step 1: State the problem

The site has previously been used for public fire extinguisher training (Table 2-4) and is currently in use for truck maintenance activities, which has potentially included the use and storage of aqueous film forming foams (AFFF). The AFFF used may have contained PFAS including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

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

Step 2: Identify the decision/goal of the study

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

- 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, concrete, groundwater and surface water from laboratory analysis.
- Identify potential exposure routes and contamination migration pathways.
- The likelihood of PFAS migrating to groundwater and subsequently off-site.

Step 4: Define the boundaries of the study

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

Table 3-1 Investigation boundaries

Boundary	Definition
Spatial boundaries	The spatial boundaries for the site are identified as the lateral extent of the groundwater monitoring bore network as shown in Figure 4, Appendix A and down to a depth of approximately 8.0 m bgl, which is the maximum intrusive investigation depth.
Temporal boundaries	The timeframe for this investigation's scope of work is primarily defined to be the period of which works were 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 site and identified off-site receptors
Potential constraints on data collection	Access to the proposed sampling locations may be restricted by services, buildings, site traffic and infrastructure

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 which 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 H.

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	19 December 2016
Work clearance	JSEA including daily pre-work assessment and hazard identification Site induction
Technical guideline	National Uniform Drillers Licensing Committee (2011) Minimum Construction Requirements for Water Bores in Australia (Edition 3, 2012)
Ground clearance	Scanning using ground penetrating radar (GPR) locating prior to mechanical drilling.
Drilling technique	Following hand auguring, push tube and solid flight augers were employed.
Bore logging	All field observations and subsurface conditions were recorded on lithological logs (Appendix F).
Field screening	Field screening for volatiles was undertaken prior to collection of soil samples for laboratory analysis using a PID, the results of which are included in Appendix F. PID calibration data is presented in Appendix E.
Soil sampling	Discrete soil samples were collected from the surface and from each lithological zone. Samples for VOC screening were collected in separate snap lock bags. Additionally, soil was sampled into laboratory supplied jars.
Sample Analysis	Two soil samples from each borehole 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), total organic carbon (TOC), cation exchange capacity (CEC), and pH.
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 (presented in Appendix G).
QA/QC	A QA/QC sampling procedure was implemented and further details are described in Section 3 and Appendix H. QA/QC sampling included an intra-laboratory duplicate sample, and one inter-laboratory duplicate sample.
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

Item	Description
	- 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 either: - 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 C.
Waste disposal	Soil cuttings and purged groundwater has been stored in two 205 L drums on site for disposal to a licenced waste facility. Waste had not been transported off site at the time of preparation of this report. Waste disposal documentation will be provided once the second stage of field works have been completed.

4.3 Sediment sampling

Table 4-2 Sediment sampling methodology

Item	Description
Date of fieldwork	20 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 G).
Decontamination	Prior to and following the collection of each 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, TOC, and pH.
Quality assurance and quality control (QA/QC)	Sediment sampling was considered part of the soil sampling program, therefore the QA/QC samples listed in Table 4-1 satisfy QA/QC requirements for sediment sampling.

4.4 Groundwater sampling

Table 4-3 Groundwater sampling methodology

Item	Description
Date of fieldwork	12 January 2017
Work clearance	JSEA including daily pre-work assessment and hazard identification Site induction
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	Two on-site monitoring wells (MW01 and MW02) 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 peristaltic 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 G).
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, BTEX, PAH and heavy metals (standard laboratory limit of reporting), major ions, pH and alkalinity and total dissolved solids (TDS). Laboratory results are summarised in Appendix B and certificates of analysis and COC included in Appendix G.
Quality assurance and quality control (QA/QC)	No QA samples were collected as it was considered as part of the surface water program; however, a trip blank was included with the samples.
Waste disposal	Purged groundwater was transferred into 205 L sealed drums on site for disposal to a licenced waste facility. Waste had not been transported off site at the time of preparation of this report. Waste disposal documentation will be provided once the second stage of field works have been completed.

4.5 Surface water sampling

Table 4-4 Surface water sampling methodology

Item	Description
Date of fieldwork	20 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.
Sampling	Surface water samples were collected from storm water drains and the water retention basin using a hand held water sampler fitted with a laboratory provided plastic unpreserved container that was changed between locations.
Sample handling and transport	The surface water samples were then transferred into laboratory provided bottles. Samples for heavy metal analysis were filtered through a 0.45um filter before being placed in the sample bottles. The sample bottles were transferred to an ice filled cool box for sample preservation prior to and during shipment to the sampling laboratory. A chain of custody form was completed, and forwarded with the samples to the testing laboratory.
Decontamination	Dedicated sample bottles were used to collect surface water samples, eliminating the need for decontamination of equipment and rinsate samples.
Sample analysis	All surface water samples were submitted for laboratory analysis of COPC including PFAS, TRH, BTEX, heavy metals, pH, TDS, major ions, and alkalinity.
Quality assurance and quality control (QA/QC)	QA/QC sampling included the collection of one inter-laboratory duplicate sample.

5. Assessment criteria

5.1 Basis for assessment

The following guidelines were adopted for the assessment of contamination at the site.

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

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

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

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

For the purpose of the assessment of data collected from the site, 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. A summary of the screening criteria nominated for the site is provided in Table 5-1. 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):

- On-site (FRNSW) and off-site commercial workers associated with the surrounding commercial/industrial areas
- Potential intrusive maintenance workers on and off-site
- Potential recreational users of surface waters down hydraulic gradient from the site
- Beneficial uses of groundwater, including domestic groundwater resources
- Ecological receptors in 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 identified receptors (section 5.2), the WA DER (2017) interim screening levels are adopted for the surface water and groundwater PFAS assessment. The nominated screening levels for PFAS are outlined in Table 5-1 and are shown on the summary results tables in Appendix B.

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

Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
Drinking water quality	0.5 µg/L	5 µg/L	Criteria adopted from DER (2017) which are based on the enHealth (2016) recommendations. Drinking water is not extracted on site and no registered domestic use groundwater bores were located in a 500 metre radius of the site. However, the potential for localised use of groundwater for domestic or stock purposes should not be discounted and as such drinking water criteria are considered for the purpose of this initial screening.
Ecological - freshwater	0.00023 µg/L	19 µg/L	Criteria adopted from DER (2017) freshwater criteria for high conservation value systems (99% species protection). Whilst the receiving ecosystem from the 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, and considering the lack of ecological receptors on-site where the investigation was conducted, no ecological soil criteria were adopted.

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 moves from soil into underlying groundwater, using a dilution factor of 10 provides some additional conservatism (NSW EPA, 2016).

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

Table 5-2 Nominated PFAS 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 based screening levels to be applied to the assessment of soil data are summarised in Table 5-3. Only commercial/industrial land use scenarios were considered in this investigation due to a lack of residential receptors on or immediately surrounding the site.

Table 5-3 Nominated PFAS 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 based			
(Not applicable to this site)			

5.4 Assessment criteria – other COPC

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 and off-site commercial/industrial land uses
- CRC Care (2011) Direct contact HSLs (commercial/industrial); for on and off-site commercial/industrial land uses
- CRC Care (2011) Intrusive maintenance worker direct contact and HSLs; for on and off-site intrusive maintenance workers

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.

Considering the lack of ecological receptors on-site where the investigation was conducted, no ecological soil criteria were adopted.

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 (Coxs River, located approximately 1 km south-east of the site), NEPM GILs for fresh waters have been adopted.

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

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

The adopted groundwater criteria are presented in Table B in Appendix B.

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 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 and is included in Appendix H.

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 at the site.

6.3 Soil results

Soil was examined by GHD during drilling works at newly installed groundwater wells (MW01 and MW02) and soil bore (SB01). Additionally, two samples of concrete were collected (from locations SB01 and MW02) and submitted for laboratory analysis. Descriptions of the site lithology including visual and olfactory observations, sample identifications along with the well construction details and elevations are presented in borehole logs contained in Appendix F.

6.3.1 Soil profile

The observed lithology at across the three 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 – 0.1 or 0.5	Gravelly SAND, pale brown (fill)
0.1 – 5.0 (SB01) or 0.5 – 2.0 (MW01 and MW02)	Sandy CLAY, grey/orange, low plasticity, stiff, fine sand (natural)
2.0 – 5.0	Gravelly SAND, brown or pale gray, fine, subangular, medium to coarse gravel, poorly graded (natural)
5.0 – not determined	Gravelly CLAY, brown, low to medium plasticity, stiff, medium to coarse gravel, poorly graded (natural)

6.3.2 Soil analytical results

The soil sampling laboratory results are summarised below and are presented in Figure 5, Appendix A and Table A1/Table A2, Appendix B. Laboratory certificates of analysis are presented in Appendix G.

All soil results were reported below the nominated screening criteria for all COPC. The concentration of PFAS analytes were low in approximately half of the samples analysed, with the results generally being less than the LOR and/or several orders of magnitude below the nominated investigation levels under a commercial/industrial land use scenario for a range of PFAS analytes.

6.4 Sediment results

6.4.1 Analytical results

Sediment samples were collected at locations SS02 (within the main warehouse) and SS03 (in driveway on eastern side of property). There was not enough sediment at proposed location SS01 to collect a sample for analysis. The sediment laboratory results presented in Figure 5 in Appendix A and Table A1/Table A2, Appendix B. Laboratory certificates of analysis are presented in Appendix G.

There was no exceedances of the adopted screening criteria for sediments.

In the absence of current screening criteria for PFAS in sediments, the DER (2017) screening criteria for soils have been applied. Given the location and profile of the samples collected, the application of soil screening criteria for initial analysis of the data set is considered appropriate for this investigation. Concentrations of PFAS in sediments were below the adopted assessment criteria. The maximum concentrations reported for PFOS and PFOA in sediments were 7.91 mg/kg and 0.137 mg/kg respectively (both at SS02).

6.5 ASLP analytical results

Four soil samples, two sediment samples and a concrete core sample 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 included:

- MW02_1.0-1.1, MW01_0.22-0.32, MW01_5.9-6.0 and SB01_0.4-0.5
- SS02 and SS03
- MW02_Concrete

The leachate laboratory results are presented on Figure 6 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 to 6.5.3.

6.5.1 Soils

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

The concentration of PFHxS and PFOS (sum of total) in leachate from MW02_1.0-1.1 was an order of magnitude greater than the concentrations from MW01 and SB01.

6.5.2 Sediment

The concentration of PFHxS and PFOS (sum of total) in both sediment leachate samples SS02 and SS03 exceeded the nominated leachability screening criteria adopted from WA DER (2017) ecological guidelines for fresh water and drinking water. SS02 reported the maximum leachate result for the site with the sum of PFOS and PFHxS reported at 77.6 µg/L, exceeding the nominated recreational screening criterion.

6.5.3 Concrete

Leachate from the concrete core sample taken at sampling location MW02 exceeded the nominated screening criteria adopted from the WA DER drinking water and ecological guidelines. The concentration of PFHxS and PFOS (sum of total) in the concrete leachate were the second greatest for all leachate samples, at 10.4 µg/L.

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	6.010	3.129	26.886	23.757
MW02	7.742	2.255	26.863	24.608

Note: TOC = top of casing

Due to the limited number of sample points, a groundwater contour map showing the interpolated groundwater contours and the inferred groundwater flow direction was not generated.

Based on the local topography and hydrogeology, the local groundwater flow was inferred to be in a north-easterly to east direction.

6.6.2 Water quality

Prior to surface water and groundwater sample collection, field parameters and observations were recorded. Field parameters for the site are summarised in Table 6-3. There was not enough water at SW02 to collect field parameters prior to sampling.

Table 6-3 Summary of water quality field parameters

Parameter range	Groundwater results	Surface water results
pH	6.59 (MW02) and 6.83 (MW01)	8.19 (SW03) to 8.39 (FW01)
Temp (°C)	25.0°C (MW01) and 27.7°C (MW02)	20.2°C (SW03) to 21.6°C (FW01)
EC (µS/cm)	5488 µS/cm (MW01) and 17,698 µS/cm (MW02)	209.6 uS/cm (MW03) to 243.3 uS/cm (FW01)
DO (mg/L)	0.87 mg/L (MW02) and 0.96 mg/L (MW01)	1.88 mg/L (FW01) to 4.47 mg/L (MW03)
ORP (mV)	73.8 mV (MW01) and 140.9 mV (MW02)	87.3 mV (MW03) to 120.6 mV (SW01)

No odours or sheen were noted in surface water or groundwater samples. The surface waters and purged groundwater were noted as clear and colourless to slightly turbid.

6.6.3 Analytical results

Samples were collected from two on site groundwater wells (MW01 and MW02) and four surface water collection points (including the recycled water holding tank). The groundwater laboratory results are summarised in Table C, Appendix B. Laboratory certificates of analysis are presented in Appendix G.

Groundwater and surface water COPC reported in excess of the nominated screening criteria are summarised in Table 6-4, and are shown on Figure 7 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 SW01, SW02 and SW03
	WA DER (2017) freshwater (ecological)	MW01 and MW02 (LOR greater than assessment criteria) FW01, SW01, SW02 and SW03
	WA DER (2017) recreational (human health)	MW01 SW01, SW02 and SW03
PFOA	WA DER (2017) Drinking water (human health)	MW01
Cadmium	NEPM GILs – Fresh water (ecological)	FW01 (primary), SW02 and SW03
	NEPM GILs – Drinking water (human health	SW02
Copper	NEPM GILs – Fresh water (ecological)	FW01 (primary and duplicate samples), SW01, SW02 and SW03
Lead	NEPM GILs – Fresh water (ecological)	SW02
Nickle	NEPM GILs – Fresh water (ecological)	SW02
	NEPM GILs – Drinking water (human health	SW02
Zinc	NEPM GILs – Fresh water (ecological)	FW01 (primary and duplicate samples), SW01, SW02 and SW03

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

The concentrations of TRH and BTEX were less than or equal to the LOR at each monitoring location, with the exception of surface water sample SW02. The concentration of TRH fractions F3 and F4 at SW02 were elevated, with a total TRH concentration in the fraction C_{10}-C_{40} of 31,400 ug/L reported.

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 guideline exceedances for dissolved metals in groundwater and surface water on site has been provided.

During the site investigation, a decommissioned underground fuel storage tank or possible tanks was discovered to the north of the truck wash. It is unknown how the underground fuel storage tank/s and associated infrastructure was decommissioned and whether there has been any environmental investigations associated with this. TRH was not the focus of this investigation however further investigation is recommended to understand how the fuel infrastructure and fuel tank was decommissioned and any environmental liabilities.

7.1 PFAS Contamination status

7.1.1 Soil and sediment

No soil and sediment samples exceeded the adopted PFAS screening criteria based on a direct contact scenario. The concentration of PFAS in soils and sediments were low in approximately half of the samples analysed, with the results generally being less than the LOR and/or several orders of magnitude below the nominated investigation levels under a commercial/industrial land use scenario for a range of PFAS analytes. However, all soil, sediment and concrete samples contained a total concentration of PFAS greater than the LOR, indicating that PFAS is present at multiple locations across this site.

PFAS leachability

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). Leachate testing completed on a number of the soil, sediment and concrete samples shows that there is substantial 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 and concrete may continue to pose a risk to ecological aquatic receptors.

Sediment samples in particular were noted to be highly leachable, exceeding both drinking water and recreational water assessment criterion for PFHxS and PFOS (sum of total). Leachate from the concrete at MW02 also exceeded the adopted drinking water assessment criterion, further supporting the conclusion that the concrete on site could be acting as an on-going source of PFAS to soils and water.

PFAS in sediments on site

The highest concentration of PFAS in sediments was reported at sampling location SS02, at a concentration greater than the remaining monitoring locations by an order of magnitude (8.9 mg/kg PFAS sum of total). The primary component of this was PFOS (7.59 mg/kg). Surface water from SS02 drains to the site interceptor, where sediments transported in the water are likely to become trapped. These sediments may act as an on-going source of PFAS water contamination via leachate (as indicated above). Water from the interceptor may be connected to sewer for disposal off site.

The second highest concentration of PFAS was reported in sediment sample; SS03, collected from the drain located on the eastern site boundary, which flows into the drain on the north-eastern corner of the site. There were no sediments in the north-eastern drain to collect for analysis. The lack of sediments at this location could be due to high water flows through the drain preventing the settlement of sediments, but is more likely to be due to lack of sediments from the site considering that the majority of the site surface is sealed by concrete. Therefore, despite the slightly elevated concentrations of PFAS in sediment samples (relative to the soil samples collected at this site), sediments are unlikely to represent a substantial risk to on site and off site receptors due to the potentially low volume of sediment emanating from the site. The volume of sediments should be confirmed by surveying/monitoring the drainage lines from the site.

PFAS in soils and concrete on site

Of the soil and concrete samples, the concentration of PFAS was greatest in the concrete and shallow soils of sampling location MW02. The concentration was noted to be highest in the concrete sample, but had decreased by two orders of magnitude in the deep soil sample at 6.9 m bgl. This potentially shows that the concrete is acting as a source of PFAS to soils via leachate (refer to above), and that there is limited vertical migration of PFAS vertically through the soil profile. The vertical decrease in concentration of PFAS was also noted in MW01 and SB01 however each of these locations had smaller concentrations of PFAS at the surface therefore the concentration gradient was less pronounced. A concrete sample was also taken from SB01, which had a concentration of PFAS an order of magnitude greater than the shallow soils beneath. This further supports the conclusion that the concrete surface on site contains PFAS and is likely to be acting as an on-going source of PFAS to sub surface soils.

Both SB01 and MW01/MW02 are located in areas that are likely to have been exposed to historical application of PFAS on this site (former fire extinguisher training area and truck wash down area respectively). Areas of known PFAS use on the site are therefore likely sources zones of PFAS to groundwater. The extent of these source zones should be further delineated on site and towards the site boundary.

7.1.2 Groundwater and surface water

Only two groundwater monitoring locations were gauged at this site. Therefore groundwater gauging results should not be used to draw conclusions about the groundwater flow direction. However, the gauging results do show that there is likely to be a southerly component to the local flow direction. This corresponds with the inferred south-easterly to easterly groundwater flow direction, based on the regional hydrology (section 2.3.5). Considering the shale aquifer is known to be highly variable on a local scale, without a detailed investigation of the hydrogeology, further conclusions with respect to flow through the system are unable to be drawn.

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

PFAS in groundwater

The concentration of PFHxS and PFOS (sum of total) at MW01 was substantially elevated (45 times greater than the adopted drinking water assessment criterion). The sample from MW01 was re-analysed by the laboratory. This process of re-analysis by the laboratory reported comparable data and the assessment of the laboratory QA/QC for both the initial and re-analysis indicated that the data was acceptable. Conversely, groundwater sample MW02 reported a concentration less than the LOR. This creates an unlikely concentration gradient between the two locations considering their close proximity to one another (approximately 15 metres).

Based on the concentrations of PFAS in soil and concrete samples, as well as the leachability of these samples (as discussed in section 7.1.1), the concentration of PFAS in the groundwater at MW01 and MW02 would be expected to be lower and higher relative to each other respectively. Additionally, they would have been expected to have relatively similar PFAS concentrations due to their close proximity. However this was not observed in the groundwater results.

There are two possible explanations for this reversal of PFAS concentrations in the groundwater results:

- There is an additional major on-going source of PFAS contamination other than the local soils and concrete (from historical impact) between the two monitoring locations. Based on the inferred groundwater flow direction (to the south-east/east), the wash bay is the most likely source zone, as identified in the preliminary site investigation (GHD, 2016).
- There is an active and/or current source of PFAS nearby to this monitoring location.

Further assessment and monitoring of MW01 and MW02, as well as delineation of the groundwater around these areas should be conducted to better understand the groundwater results.

The groundwater at MW01 exceeded the WA DER (2017) ecological, drinking water and recreational assessment criterion for PFHxS and PFOS (sum of total), indicating that there may be a risk to human health and ecological receptors. Considering that the site is surrounded by commercial land use, and that the closest registered abstraction bores is 1.7 km north-east of the site, the closest likely groundwater receptor is likely to be Coxs Creek (located approximately 1 km south-east). However, as noted in section 2.3.5, the groundwater flow at the site is likely to be governed by the local geology, which is described as having low potential for groundwater movement (*1:2,000,000 Groundwater in New South Wales, Assessment of Pollution Risk Map*, 1987). Further delineation of the groundwater down gradient of MW01 would clarify the potential risk to ecological receptors in Coxs Creek.

PFAS in surface waters

All surface water samples exceeded the WA DER (2017) drinking water and ecological assessment criteria for PFHxS and PFOS (sum of total).

PFAS was detected in the surface water drain within the main warehouse (SW02). As stated in section 7.1.1, this drain is connected to the site interceptor which may then discharge to the sewer system. PFAS was also detected in the stormwater drain along the eastern site boundary (SW03), and in the down gradient drain on north-eastern corner of the site (SW01), carrying surface water off-site. This indicates that impacted water from the site (source not yet identified) is potentially travelling off-site via two different surface water systems. The concentrations of

PFAS in surface water from these three monitoring locations exceeded the WA DER (2017) ecological, drinking water and recreational assessment criterion for PFHxS and PFOS (sum of total), indicating that there may be a risk to human health and ecological receptors. However, it is unknown how far these waters travel before being discharged to a new environment (either with or without prior treatment). Water from the stormwater and sewage system are unlikely to be used directly as drinking water and recreational water sources based on the general commercial nature of the site and surrounding land use setting. Therefore GHD considers that the drinking water and recreational water exceedances in surface water from SW01, SW02 and SW03 are unlikely to represent an immediate unacceptable risk to human health. Further assessment of PFAS concentrations in surface water at the point of discharge should be conducted to assess the potential risk to ecological receptors in the area of discharge, and to evaluate the likelihood of human receptors at the point of discharge.

It was noted that a small concentration of PFAS was detected in the recycled fire water retention basin (FW01). This storage unit is understood to have large volumes of fresh, clean water moving through it from the trucks.

7.2 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 122 µg/L collected from SS02. This classifies the site as a 'Priority 1 site' under the EnRisk (2016) decision tree process based on soil leachate data.

Groundwater and surface water data

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

The maximum total PFAS concentration reported for surface water was 276 µg/L in MW01. In addition, the maximum concentration of total PFAS in surface water samples was 104 µg/L (SW02), collected from the main warehouse drainage system. Therefore based on both surface water and groundwater data, the site would be classified as a priority 1 site.

[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)

7.2.1 Overall prioritisation of the site

As outlined above, soil leachate and groundwater analytical data would classify the site as a priority 1 site. 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, and mechanical fixing of the NSW truck fleet (including washing and emptying the truck tanks). AFFF containing PFAS are no longer used at the site.

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

- Concrete around MW02
- The wash bay between MW01 and MW02 (requires further assessment to confirm)
- The main warehouse and mechanical workshop (including PFAS storage areas)
- Concrete on historic fire extinguisher training area on the south east portion of the site (minor source area).

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

Other potential historical COPC included TRH, BTEX and PAHs from motor oils from vehicles (historic and current). Analytical results for heavy fraction TRHs were elevated sediment from the main warehouse (SS02). Surface water from the same monitoring location was also elevated, indicating that mechanical operations in the warehouse are a potential source of contamination. The former fuel underground storage tank may also be a potential source.

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.

Although drinking water receptors have been considered in this investigation (as per the NSW EPA (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*), GHD understands that groundwater is not extracted at the site nor off-site for any beneficial purpose (including recreation and/or stock watering). Additionally, the groundwater in the region is relatively saline (section 2.3.5 and confirmed in Table 6-3), and there is a reliable mains supply of water. The likelihood of groundwater being used as a potable water source is considered to be low.

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 roof monitors and hoses allows for it to spread through airborne dispersion beyond the training area. Typically, this results in diffuse low levels of PFAS over a wider area. Generally, the highest soil concentrations tend to be at the point source.

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

Once in soil, PFAS can leach from soil to water (due to its solubility in water) as water migrates downward through soil to the water table, resulting in contaminated groundwater. Generally, the shorter chain PFAS species are more soluble than the longer chain PFAS. Groundwater will migrate and discharge into the nearest down gradient surface water body – in the case of the site the main discharge area is likely to be the Cooks River. 1.2 km east of site. The Cooks River is used for recreational activities and fishing purposes (although consumption of fish caught in this area is banned).

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

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

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

The surface water on-site collects via stormwater pits and exits the site in the north eastern corner of the site. This then connects to a stormwater pipe that discharges into the Cooks River, 1.2 km east of the site. The main surface water receptors considered to be the Cooks River and ultimately Botany Bay.

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

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

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

8.4 Source-pathway-receptor linkages

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

Table 8-1 Updated CSM

Potential source	Primary pathway	Receptor	Pathway present?
Concrete ground surface (and subsequent impacted shallow soils) around MW02 and in historic training area (SB01)	Dermal contact	FRNSW and wider training facility commercial workers	No – PFAS impact detected in samples however impact below adopted assessment criteria.
		Intrusive maintenance workers	No – PFAS impact detected in samples however impact below adopted assessment criteria.
	Vertical/horizontal migration of leachate through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Possible – PFAS impact in MW01 groundwater however no source identified (further assessment required)
	Surface runoff and sediment transport via drainage systems leading off site	Surface waters (including to commercial properties, recreational and ecological receptors)	Possible – PFAS detected greater than the adopted human health and ecological assessment criteria in surface water samples from drainage lines potentially associated with the area around MW02. However the source of PFAS in surface water samples SW01 and SW03 is to be confirmed.

Potential source	Primary pathway	Receptor	Pathway present?
			Concrete surface on site will minimise movement of shallow soils in surface water runoff. Additionally, the likelihood of adjacent commercial properties using surface water flow is low. Final destination of drainage systems is currently unknown, but may be connected to the local river systems (Cooks River).
Impacted sediment in main the warehouse and mechanical workshop (including PFAS storage areas)	Dermal contact and ingestion	FRNSW and wider training facility commercial workers	No – PFAS impact at SS02 was reported below adopted screening criteria.
	Leaching into surface waters. Flow through on site drainage systems (either as leachate or sediments)	Off-site commercial properties at point of discharge	Unlikely – PFAS concentration at SW02 greater than adopted drinking water assessment criteria. Final point of discharge unknown, however water from this source unlikely to be used for drinking water purposes.
		Off-site recreational and ecological receptors at point of discharge.	Possible – PFAS concentration at SW02 greater than adopted recreational ecological assessment criteria. Final point of discharge unknown.
Wash bay between MW01 and MW02	Vertical/horizontal migration of leachate through unsaturated zone	Groundwater	Likely – PFAS contamination detected in MW01 groundwater and only up gradient source (base on inferred flow direction) is the washbay.
Contaminated groundwater (secondary source)	Vertical/horizontal migration	Down gradient surface waters recharged by groundwater	Possible – PFAS impact above adopted recreational and ecological assessment criteria at MW01. No delineation of the potential extent of groundwater impact (if any) down gradient of the site. The full extent of contamination in groundwater and hydraulic connection to surface waters has not been investigated.

Potential source	Primary pathway	Receptor	Pathway present?
		Abstraction bores (stock and/or domestic use)	No – closest registered abstraction bore is 1.7 km north-east (up gradient based on inferred groundwater flow direction) of the site.
		Intrusive maintenance workers on site	Unlikely – PFAS detected above human health assessment criterion and groundwater is greater than 2.5 m bgl.
Sediments and surface waters impacted by 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, ecological receptors and/or groundwater	Possible – sediment sample SS02 had elevated TRH fractions. Elevated TRH fractions were also detected in SW02. There is potential for these contaminants to flow off site via the surface water drainage system, but final point of discharge is unknown at this stage.
Former underground fuel storage tank/s	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, ecological receptors and/or groundwater	Unknown – GHD has not undertaken any investigation around the location.

9. Conclusions and recommendations

9.1 Conclusions

The scope of works presented in Section 1.3 of this report, subject to the limitations presented in Section 11, determined the following:

- Soil, sediment, surface water and groundwater samples were collected from areas of potential concern. Two groundwater wells were installed on site. All sampling was limited to on-site and no off-site samples were collected as part of this preliminary stage of works.
- Laboratory analyses indicate the presence of PFAS in all media sampled (soils, sediment, soil and sediment leachate, surface water and groundwater) and a number of locations report concentrations above the relevant screening criteria for the protection of human health and/ or ecological receptors.
- Impacted concrete, soil and sediments may continue to act as a source of PFAS to surface and groundwater receptors.
- Elevated PFAS concentrations were reported in one on-site groundwater well (MW01). The extent and source of this impact is not fully understood and further investigation is required to understand the extent of impact including off-site migration.
- Surface water samples collected from stormwater drains indicate PFAS impacted surface water (and possibly sediments) is migrating off-site via the drain in the north-east corner of the site and via the site interceptor.
- Elevated concentrations of heavy fraction hydrocarbons were reported in surface water collected from the drain within the main warehouse (SW02). A corresponding increase was noted in sediment samples collected from the same location. Whilst it is acknowledge that this drain leads to the oil/water interceptor on-site, the presence of hydrocarbon impact within the main warehouse is noted and further recommendations for management of this issue are provided in Section 9.2.

9.2 Recommendations

Based on these conclusions, the following recommendations are made:

- Consider immediate management actions which can be implemented on-site to restrict the flow of PFAS to off site receptors. This could include removing concrete and shallow soils around MW02 and at SB01 to prevent further leaching of PFAS to the surrounding media (including deeper soils and groundwater). Sediments should be cleared out of all drainage systems in the main warehouse and along the eastern site boundary as a precautionary measure
  - GHD acknowledges that the volume of sediment from the site is likely to be small and is therefore unlikely to represent a substantial risk to on site and off site receptors. Clearing out drainage lines is a precautionary measure, however consideration could also be given to monitoring sediment transport volumes through the drainage network. Clearing out the drainage lines in the main warehouse will also help address the hydrocarbon impact noted in sediment sample SS02.
  - It is likely that the site interceptor has trapped PFAS contaminated sediments. FRNSW should also consider clearing out the interceptor in conjunction with the drainage channels in the main warehouse.

  - The extent of the source zones in the concrete and shallow soils is not well understood. Further assessment should be conducted to adequately delineate the area of historic AFFF use on site and towards the site boundary.
- Further assessment to understand the source of PFAS contamination in groundwater at MW01 and likelihood of off-site impact. Delineation of groundwater impact is required to adequately understand groundwater flow directions and the possible sources of PFAS impact at this monitoring location. Future sampling events should include re-sampling of locations MW01 and MW02 (plus any subsequent monitoring bores) to better understand the extent of PFAS contamination in the groundwater and validate the results of this stage of assessment.
- Survey of surface water flows to better understand the drainage pathways throughout the site and likely migration pathways for PFAS. Additionally, assess where water flowing off-site discharges to after flowing through both the site interceptor and the storm water drain on the north-east corner of the site. The aim of these works would be to better understand the likely receptors at the point of discharge. Further sampling should be conducted at the point of discharge to delineate PFAS contamination off-site and to evaluate the risk to the identified off-site receptors.
- Review of the on-site management practices of hydrocarbons in the drainage system through the main warehouse. Ensure the relevant environmental management plans are in place and align to industry standards for handling and storage of hydrocarbons.
- Additional sampling following source removal works (both PFAS and TRH) to evaluate the effectiveness of these management actions. Sampling should consider seasonal fluctuations and rainfall events to gain sufficient data to appropriately evaluate the risks to possible sensitive receptors.
- Additional sampling to further understand the extent of impact, in particular focusing on characterisation of off-site migration and the lateral extent of PFAS impact.
- Further information is required on the decommissioned fuel infrastructure including any reports and environmental investigations that may have been undertaken.

10. References

ANZECC (2000). National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, October 2000,

Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

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

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

ASRIS (2013) Australian Soil Resource Information System, 2013

Australian and New Zealand Environmental Conservation Council (ANZECC & ARMCANZ 2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*

Department of Mineral Resources and Energy (1971) *1:250,000 Geological Series Sheet 5610&11, Dorrigo and Coffs Harbour*. NSW Department of Mineral Resources and Energy, Sydney, NSW

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

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

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

EnRisk (2016) *Proposed decision tree for prioritising sites potentially contaminated with PFAS.* 25 February 2016

National Health and Medical Research Council (NHMRC & NRMMC 2011) *Australian Drinking Water Guidelines*

National Health and Medical Research Council (NHMRC 2008) *Guidelines for Managing Risk in Recreational Waters*

National Uniform Drillers Licensing Committee (2011) *Minimum Construction Requirements for Water Bores in Australia* (Edition 3, 2012)

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

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

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

NSW EPA, 1995; Contaminated Sites: Sampling Design Guidelines

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

Strathfield LEP 2012

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

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

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

11. Limitations

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

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

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

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

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

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

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

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

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

Appendices

Appendix A – Figures

LEGEND

- Site Boundary
- Streets
- Major Waterways
- Minor Waterways

0 25 50 100 150 200

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

N

Fire & Rescue NSW
Greenacre Site Investigation

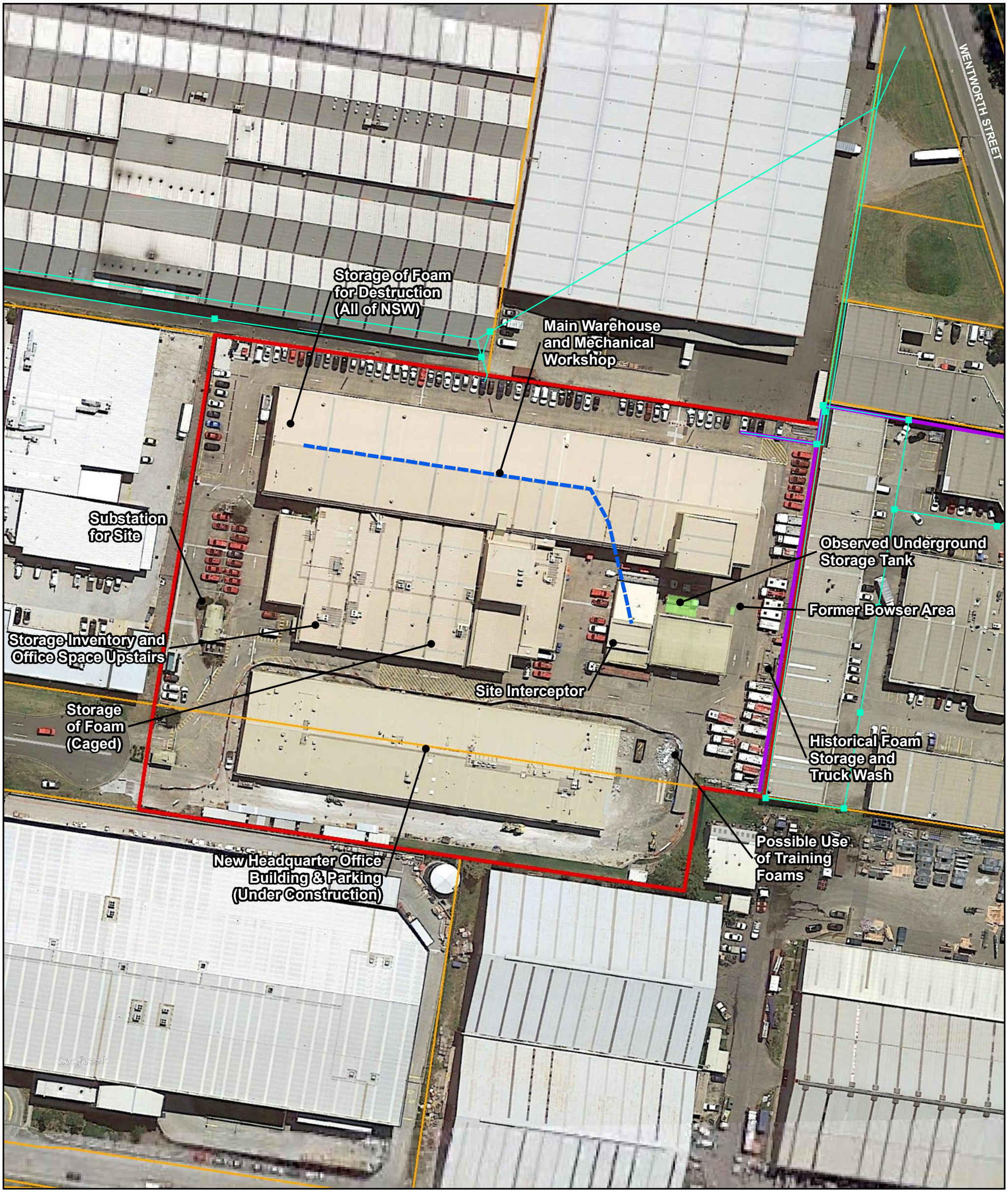
Site Location and Key Off-site Receptors

Job Number 21-25583
Revision A
Date 28 Feb 2017

Figure 1

G:\21\25583\GIS\Maps\Deliverables\Greenacre\21_25583_Z001_Greenacre_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 - Google Earth Pro; Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham



LEGEND

- Site Boundary
- Cadastre
- Streets
- Storm Water Pits/Trenches
- Drainage Channel
- Surface Water Drainage Lines
- Gas Line

0 5 10 20 30 40 50

Metres

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

N

GHD

Fire & Rescue NSW
Greenacre Site Investigation

Job Number 21-25583
Revision A
Date 28 Feb 2017

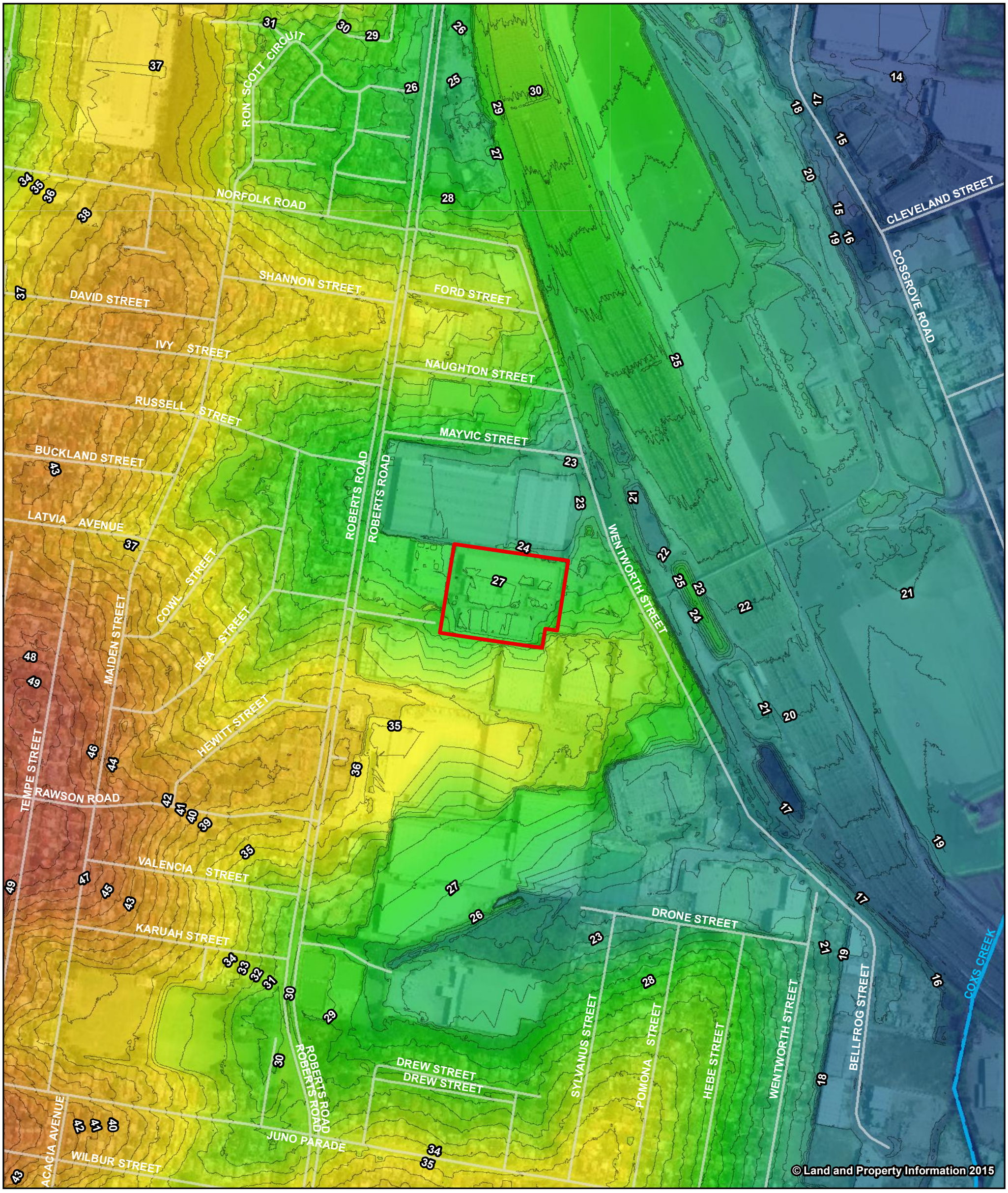
Site Layout

Figure 2

G:\21\25583\GIS\Maps\Deliverables\Greenacre\21_25583_Z002_Greenacre_SiteLayout.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:tnham



LEGEND

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

Value

High : 50.251

Low : 11.81

0 25 50 100 150 200

Metres

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

N

Fire & Rescue NSW
Greenacre Site Investigation

Job Number 21-25583
Revision A
Date 18 Jan 2017

Elevation

Figure 3

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: 18/01/17); Streets, Waterways - NSW LPI 2012 DTDB; LIDAR - NSW LPI. Created by:tnham

LEGEND

- Site Boundary
- Storm Water Pits/Trenches
- Drainage Channel
- Surface Water Drainage Lines
- Gas Line
- Groundwater Monitoring Well (GHD, 2016) (2)
- Soil Borehole (GHD, 2016) (1)
- Sediment Sample Location (GHD, 2016) (2)
- Surface Water Sample Location (GHD, 2016) (3)
- Recycled Fire Water Sample (GHD, 2016) (1)

Paper Size A3

0 2.5 5 10 15 20 25 30

Metres

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

N

GHD

Fire & Rescue NSW
Greenacre Site Investigation

Job Number	21-25583
Revision	A
Date	28 Feb 2017

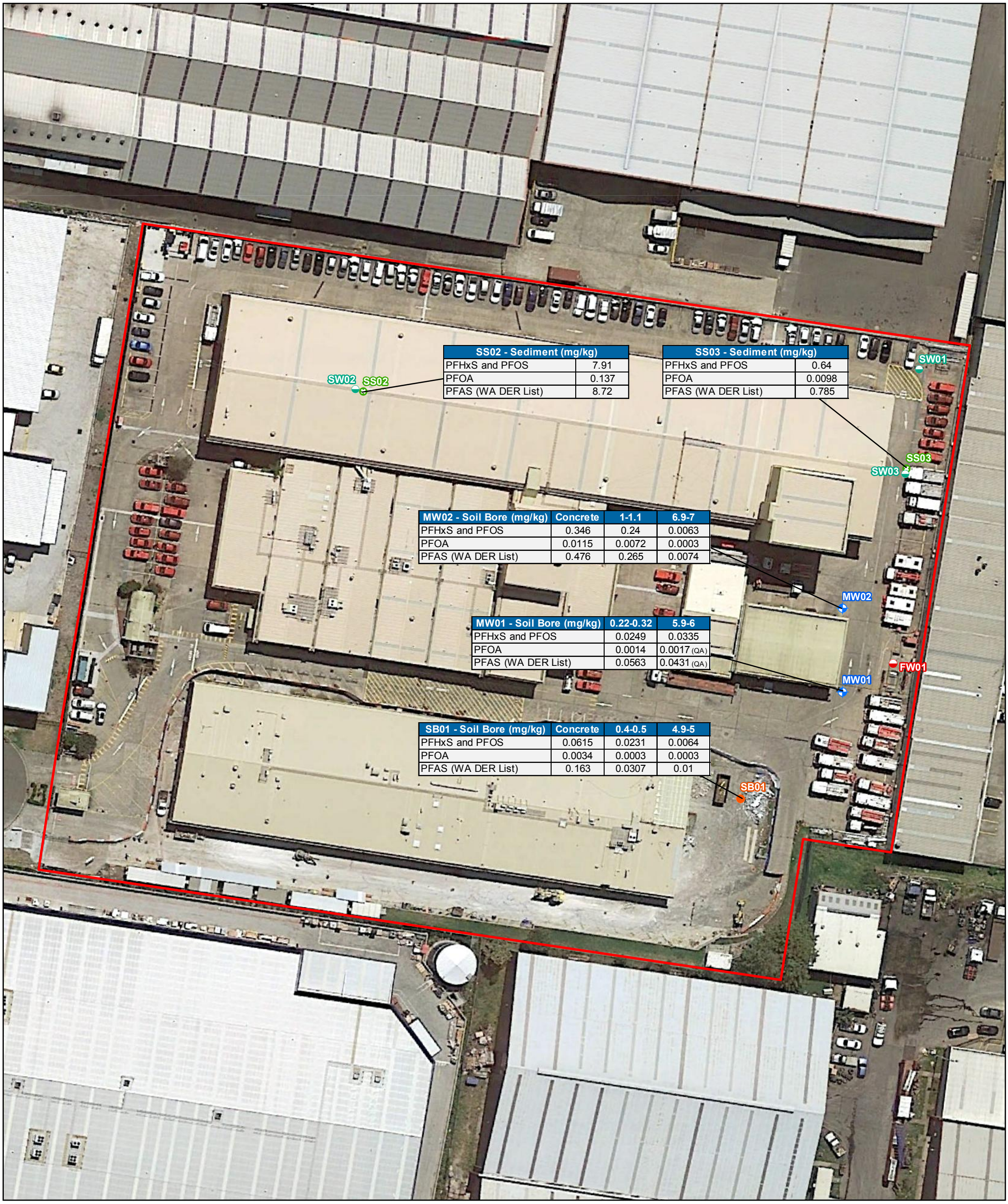
Investigation Locations

Figure 3

G:\21\25583\GIS\Maps\Deliverables\Greenacre\21_25583_Z004_Greenacre_InvestigationLocations.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: 28/02/17); Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham



SS02 - Sediment (mg/kg)	
PFHxS and PFOS	7.91
PFOA	0.137
PFAS (WA DER List)	8.72

SS03 - Sediment (mg/kg)	
PFHxS and PFOS	0.64
PFOA	0.0098
PFAS (WA DER List)	0.785

MW02 - Soil Bore (mg/kg)	Concrete	1-1.1	6.9-7
PFHxS and PFOS	0.346	0.24	0.0063
PFOA	0.0115	0.0072	0.0003
PFAS (WA DER List)	0.476	0.265	0.0074

MW01 - Soil Bore (mg/kg)	0.22-0.32	5.9-6
PFHxS and PFOS	0.0249	0.0335
PFOA	0.0014	0.0017 (QA)
PFAS (WA DER List)	0.0563	0.0431 (QA)

SB01 - Soil Bore (mg/kg)	Concrete	0.4-0.5	4.9-5
PFHxS and PFOS	0.0615	0.0231	0.0064
PFOA	0.0034	0.0003	0.0003
PFAS (WA DER List)	0.163	0.0307	0.01

LEGEND

- Site Boundary
- Groundwater Monitoring Well (GHD, 2016) (2)
- Soil Borehole (GHD, 2016) (1)
- Sediment Sample Location (GHD, 2016) (2)
- Surface Water Sample Location (GHD, 2016) (3)
- Recycled Fire Water Sample (GHD, 2016) (1)

Paper Size A3

0 2.5 5 10 15 20 25 30

Metres

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

N

GHD

Fire & Rescue NSW
Greenacre Site Investigation

Soil and Sediment Exceedances & PFAS Results

Job Number 21-25583
Revision A
Date 28 Feb 2017

Figure 4

G:\21\25583\GIS\Maps\Deliverables\Greenacre\21_25583_Z005_Greenacre_SoilExceedances.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: 28/02/17); Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham

SS02 - ASLP (µg/L)	
PFHxS and PFOS	77.6
PFOA	1.72
PFAS (WA DER List)	122

SS03 - ASLP (µg/L)	
PFHxS and PFOS	5.09
PFOA	0.04
PFAS (WA DER List)	6.34

MW02 - ASLP (µg/L)	Concrete	1-1.1
PFHxS and PFOS	10.4	4.26
PFOA	0.33	0.07
PFAS (WA DER List)	14.6	4.52

MW01 - ASLP (µg/L)	0.22-0.32	5.9-6
PFHxS and PFOS	0.87	0.66
PFOA	0.05	0.02
PFAS (WA DER List)	1.48	0.91

SB01 - ASLP (µg/L)	0.4-0.5
PFHxS and PFOS	0.77
PFOA	<0.01
PFAS (WA DER List)	0.95

LEGEND

- Site Boundary
- Groundwater Monitoring Well (GHD, 2016) (2)
- Soil Borehole (GHD, 2016) (1)
- Sediment Sample Location (GHD, 2016) (2)
- Surface Water Sample Location (GHD, 2016) (3)
- Recycled Fire Water Sample (GHD, 2016) (1)

Paper Size A3

0 2.5 5 10 15 20 25 30

Metres

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

N

Fire & Rescue NSW
Greenacre Site Investigation

ASLP Exceedances & PFAS Results

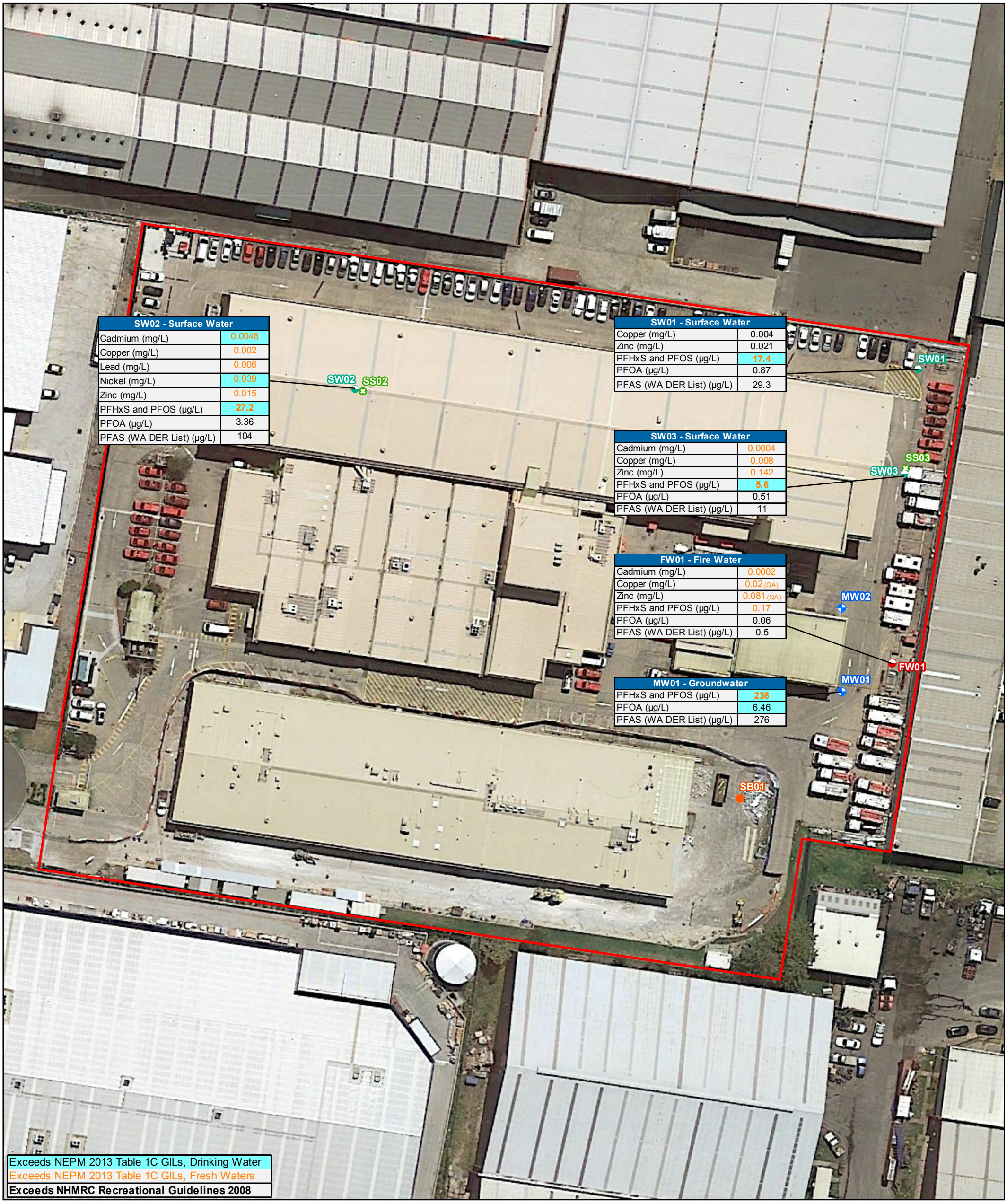
Job Number 21-25583
Revision A
Date 28 Feb 2017

Figure 5

G:\21\25583\GIS\Maps\Deliverables\Greenacre\21_25583_Z006_Greenacre_ASLPExceedances.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: 28/02/17); Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham



LEGEND

- Site Boundary
- Groundwater Monitoring Well (GHD, 2016) (2)
- Soil Borehole (GHD, 2016) (1)
- Sediment Sample Location (GHD, 2016) (2)
- Surface Water Sample Location (GHD, 2016) (3)
- Recycled Fire Water Sample (GHD, 2016) (1)

Paper Size A3

0 2.5 5 10 15 20 25 30

Metres

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

N

Fire & Rescue NSW
Greenacre Site Investigation

Job Number 21-25583
Revision A
Date 28 Feb 2017

Groundwater and Surface Water Exceedances & PFAS Results

Figure 6

G:\21\25583\GIS\Maps\Deliverables\Greenacre\21_25583_Z007_Greenacre_WaterExceedances.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: 28/02/17); Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham

Appendix B – Analytical results summary tables

Site_ID	Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time		Cations					Unassigned	Inorganics					
					Organic Matter	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC	TCLP Fluid	pH (Final)	pH (Initial)	Moisture	Moisture Content (dried @ 103°C)	pH (Lab)	pH (after HCL)
					%	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	mg/kg	pH Units	pH Units	%	%	pH Units	pH Units
EQL					0.5	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	1	1	0.1	0.1
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																	
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																	
0-1m																	
1-2m																	
2-4m																	
>4m																	
Greenacre FRNSW	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	<0.5	3.7	0.5	<0.2	<0.2	4.4	-	8.9	-	17.5	-	9	-
Greenacre FRNSW	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	0.7	2.9	3	0.3	1.9	8	1	5.6 - 8.9	9.5	14.9	-	9.1	1.9
Greenacre FRNSW	QA04	MW01	5.9-6	19/12/2016	-	-	-	-	-	-	-	-	-	16.4	-	-	-
Greenacre FRNSW	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	0.7	1.3	11.7	0.4	4.3	17.7	1	4.4 - 5.5	5.2	19.8	-	6.1	1.7
Greenacre FRNSW	MW02_6.9-7.0	MW02	6.9-7	19/12/2016	0.6	2.1	2.9	0.4	1.7	7.1	-	-	-	8.2	-	9.2	-
Greenacre FRNSW	QA02	MW02	6.9-7	19/12/2016	-	-	-	-	-	-	-	-	-	-	9	-	-
Greenacre FRNSW	MW02_Concrete	MW02		19/12/2016	-	-	-	-	-	-	-	11.9	-	4.1	-	-	-
Greenacre FRNSW	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	<0.5	3.4	7.1	0.2	3.4	14.2	-	7.8	-	19.6	-	7.2	-
Greenacre FRNSW	SB01_4.9-5.0	SB01	4.9-5	19/12/2016	<0.5	3.2	3.1	<0.2	2.6	9.1	-	-	-	8.2	-	9.3	-
Greenacre FRNSW	SB01_Concrete	SB01		19/12/2016	-	-	-	-	-	-	-	-	-	6.1	-	-	-
Greenacre FRNSW	SS02	SS02		20/12/2016	13.3	-	-	-	-	-	-	7.8	-	1.5	-	7.5	-
Greenacre FRNSW	SS03	SS03		20/12/2016	5.1	-	-	-	-	-	-	8.2	-	39	-	7.6	-

Field_ID	TRH - NEPM 2013							TRH - NEPM 1999					BTEX		
	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
	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
DER (2017) Interim PFAS Guidelines - Health commercial/industrial															
CRCCare Soil Direct Contact HSL-D Commercial / Industrial		**26000**		**20000**	**27000**	**38000**							**430**	**99000**	**27000**
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
1-2m	370[#6]		NL										3	NL	NL
2-4m	630[#6]		NL										3	NL	NL
>4m	NL		NL										3	NL	NL
MW01_0.22-0.32	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
MW01_5.9-6.0	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
QA04	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
MW02_1.0-1.1	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
MW02_6.9-7.0	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
QA02	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<50	<0.1	<0.1	<0.1
MW02_Concrete	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SB01_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
SB01_4.9-5.0	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5
SB01_Concrete	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS02	<10	18	190	190	14,000	3080	17,300	16	100	9950	5760	15,800	<0.2	<0.5	0.6
SS03	10	13	<50	<50	1180	400	1580	<10	<50	630	710	1340	<0.2	<0.5	<0.5

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

				K & MAH				PAH																						SVOCs						
				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-cd)pyrene	Naphthalene	Phenanthrene	PAHs (Sum of total) - Lab calc	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ (half LOR)	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
				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				0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002
DER (2017) Interim PFAS Guidelines - Health commercial/industrial																														100					
CRCCare Soil Direct Contact HSL-D Commercial / Industrial						**81000**																	**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						230																	NL												
1-2m						NL																	NL												
2-4m						NL																	NL												
>4m						NL																	NL												
Site_ID	**Field_ID**	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**																																
Greenacre FRNSW	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	0.0009	0.0249	<0.0005	0.001	<0.0002	<0.0002	0.0005
Greenacre FRNSW	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	<0.0002	0.0335	<0.0005	<0.0005	<0.0002	<0.0002	0.002
Greenacre FRNSW	QA04	MW01	5.9-6	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	<0.0002	0.0332	<0.0005	<0.0005	<0.0002	<0.0002	0.0023
Greenacre FRNSW	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	<0.0002	0.24	<0.0005	<0.0005	<0.0002	<0.0002	0.0043
Greenacre FRNSW	MW02_6.9-7.0	MW02	6.9-7	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	<0.0002	0.0063	<0.0005	<0.0005	<0.0002	<0.0002	0.0003
Greenacre FRNSW	QA02	MW02	6.9-7	19/12/2016	<0.1	<0.2	<0.3	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.005	-	<0.005	-	-	-	<0.005
Greenacre FRNSW	MW02_Concrete	MW02		19/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.346	<0.0005	<0.0005	<0.0002	<0.0002	0.0346
Greenacre FRNSW	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	<0.0002	0.0231	<0.0005	<0.0005	<0.0002	<0.0002	0.0007
Greenacre FRNSW	SB01_4.9-5.0	SB01	4.9-5	19/12/2016	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	<0.0002	0.0064	<0.0005	<0.0005	<0.0002	<0.0002	0.0014
Greenacre FRNSW	SB01_Concrete	SB01		19/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0615	<0.0005	<0.0005	<0.0002	<0.0002	0.0311
Greenacre FRNSW	SS02	SS02		20/12/2016	4.4	4.8	9.2	9.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<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	0.0213	7.91	<0.0005	0.0368	0.0017	0.0017	0.0077
Greenacre FRNSW	SS03	SS03		20/12/2016	2.2	1.1	3.3	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	1.2	0.6	0.0064	0.64	<0.0005	0.0208	0.0016	0.001	0.0035

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be cons
#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% bioavailabilit
#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered
#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence o
#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7:Derived soil HSL exceeds soil saturation concentration

Appendix B
Table A1
Soil analytical results: Human health

	PFAS																								
	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)
	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	0.0002	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	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002
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																								
Site_ID	**Field_ID**	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**																					
Greenacre FRNSW	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	0.0008	0.005	0.0035	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0202	0.0014	0.0005	<0.001	<0.0002	0.0002	0.0009	0.0049	<0.0002	0.0199	0.0004	<0.0005	0.0004	<0.0002	0.0605	0.0563
Greenacre FRNSW	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	0.0009	0.0203	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0013	<0.001	<0.0002	<0.0002	0.0003	0.0047	<0.0002	0.0132	<0.0002	<0.0005	<0.0002	<0.0002	0.0449	0.0427
Greenacre FRNSW	QA04	MW01	5.9-6	19/12/2016	0.0011	0.0221	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0017	0.0015	<0.001	<0.0002	<0.0002	<0.0002	0.005	<0.0002	0.0111	<0.0002	<0.0005	<0.0002	<0.0002	0.0457	0.0431
Greenacre FRNSW	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	0.0101	0.0445	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0028	0.0072	0.0044	<0.001	<0.0002	<0.0002	0.0024	0.0062	<0.0002	0.196	<0.0002	<0.0005	<0.0002	<0.0002	0.28	0.265
Greenacre FRNSW	MW02_6.9-7.0	MW02	6.9-7	19/12/2016	<0.0002	0.0021	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0042	<0.0002	<0.0005	<0.0002	<0.0002	0.0076	0.0074
Greenacre FRNSW	QA02	MW02	6.9-7	19/12/2016	-	<0.005	<0.005	<0.005	<0.01	-	<0.01	-	<0.01	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	-	-
Greenacre FRNSW	MW02_Concrete	MW02		19/12/2016	0.0095	0.106	0.0121	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0222	0.0115	0.0186	<0.001	<0.0002	<0.0002	0.0068	0.0428	0.0006	0.24	0.0007	<0.0005	<0.0002	<0.0002	0.505	0.476
Greenacre FRNSW	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	<0.0002	0.0067	0.0011	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0003	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.0025	<0.0002	0.0164	<0.0002	<0.0005	<0.0002	<0.0002	0.031	0.0307
Greenacre FRNSW	SB01_4.9-5.0	SB01	4.9-5	19/12/2016	<0.0002	0.0054	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	0.0008	<0.001	<0.0002	<0.0002	<0.0002	0.0015	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.0108	0.01
Greenacre FRNSW	SB01_Concrete	SB01		19/12/2016	0.0012	0.0458	0.0076	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0214	0.0034	0.0145	<0.001	<0.0002	<0.0002	0.0049	0.0334	0.0006	0.0157	<0.0002	<0.0005	<0.0002	<0.0002	0.18	0.163
Greenacre FRNSW	SS02	SS02		20/12/2016	0.0882	0.321	0.0056	0.22	<0.0005	<0.0005	<0.0005	<0.0005	0.319	0.137	0.0182	<0.001	0.002	0.0009	0.0278	0.0947	0.0006	7.59	0.0092	<0.0005	<0.0002	<0.0002	8.9	8.72
Greenacre FRNSW	SS03	SS03		20/12/2016	0.0051	0.0379	0.0037	0.0658	<0.0005	<0.0005	<0.0005	<0.0005	0.0468	0.0098	0.0031	<0.001	0.001	0.0004	0.0036	0.0115	0.0005	0.602	0.0066	<0.0005	<0.0002	0.0002	0.831	0.785

Env Stds Comments

#1:Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be cons
#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% bioavailabilit
#4:Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered
#5:Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence
#6:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#7:Derived soil HSL exceeds soil saturation concentration

Appendix B
Table A2
Soil analytical results: IMW

Fire Rescue NSW
Greenacre FRNSW
Greenacre FRNSW Site Investigation

				Cations						Unassigned	Inorganics						TRH - NEPM 2013							TRH - NEPM 1999					BTEX & MA				
				Organic Matter	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC	TCLP Fluid	pH (Final)	pH (Initial)	Moisture	Moisture Content (dried @ 103°C)	pH (Lab)	pH (after HCL)	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)
				%	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	mg/kg	pH Units	pH Units	%	%	pH Units	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	1	1	0.1	0.1	10	10	50	50	100	100	50	10	50	100	100	50	0.2	0.5	0.5	0.5
CRCCare Soil Direct Contact Intrusive Works																		*82000*		*62000*	*85000*	*120000*							*1100*	*120000*	*85000*	
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	
Site_ID	**Field_ID**	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**																													
Greenacre FRNSW	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	<0.5	3.7	0.5	<0.2	<0.2	4.4	-	8.9	-	17.5	-	9	-	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	0.7	2.9	3	0.3	1.9	8	1	5.6 - 8.9	9.5	14.9	-	9.1	1.9	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	QA04	MW01	5.9-6	19/12/2016	-	-	-	-	-	-	-	-	-	16.4	-	-	-	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	0.7	1.3	11.7	0.4	4.3	17.7	1	4.4 - 5.5	5.2	19.8	-	6.1	1.7	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	MW02_6.9-7.0	MW02	6.9-7	19/12/2016	0.6	2.1	2.9	0.4	1.7	7.1	-	-	-	8.2	-	9.2	-	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	QA02	MW02	6.9-7	19/12/2016	-	-	-	-	-	-	-	-	-	-	9	-	-	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<50	<0.1	<0.1	<0.1	<0.1
Greenacre FRNSW	MW02_Concrete	MW02		19/12/2016	-	-	-	-	-	-	-	11.9	-	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greenacre FRNSW	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	<0.5	3.4	7.1	0.2	3.4	14.2	-	7.8	-	19.6	-	7.2	-	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	SB01_4.9-5.0	SB01	4.9-5	19/12/2016	<0.5	3.2	3.1	<0.2	2.6	9.1	-	-	-	8.2	-	9.3	-	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5
Greenacre FRNSW	SB01_Concrete	SB01		19/12/2016	-	-	-	-	-	-	-	-	-	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greenacre FRNSW	SS02	SS02		20/12/2016	13.3	-	-	-	-	-	-	7.8	-	1.5	-	7.5	-	<10	18	190	190	14,000	3080	17,300	16	100	9950	5760	15,800	<0.2	<0.5	0.6	4.4
Greenacre FRNSW	SS03	SS03		20/12/2016	5.1	-	-	-	-	-	-	8.2	-	39	-	7.6	-	10	13	<50	<50	1180	400	1580	<10	<50	630	710	1340	<0.2	<0.5	<0.5	2.2

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.

				H			PAH																		SVOCs									
				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	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
				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	0.5	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
CRCCare Soil Direct Contact Intrusive Works					*130000*																	*29000*												
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												
Site_ID	**Field_ID**	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**																															
Greenacre FRNSW	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0009	0.0249	<0.0005	0.001	<0.0002	<0.0002	0.0005	0.0008
Greenacre FRNSW	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	0.0335	<0.0005	<0.0005	<0.0002	<0.0002	0.002	0.0009
Greenacre FRNSW	QA04	MW01	5.9-6	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	0.0332	<0.0005	<0.0005	<0.0002	<0.0002	0.0023	0.0011
Greenacre FRNSW	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	0.24	<0.0005	<0.0005	<0.0002	<0.0002	0.0043	0.0101
Greenacre FRNSW	MW02_6.9-7.0	MW02	6.9-7	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	0.0063	<0.0005	<0.0005	<0.0002	<0.0002	0.0003	<0.0002
Greenacre FRNSW	QA02	MW02	6.9-7	19/12/2016	<0.2	<0.3	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.005	-	<0.005	-	-	-	<0.005	-
Greenacre FRNSW	MW02_Concrete	MW02		19/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.346	<0.0005	<0.0005	<0.0002	<0.0002	0.0346	0.0095
Greenacre FRNSW	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	0.0231	<0.0005	<0.0005	<0.0002	<0.0002	0.0007	<0.0002
Greenacre FRNSW	SB01_4.9-5.0	SB01	4.9-5	19/12/2016	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	0.0064	<0.0005	<0.0005	<0.0002	<0.0002	0.0014	<0.0002
Greenacre FRNSW	SB01_Concrete	SB01		19/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0615	<0.0005	<0.0005	<0.0002	<0.0002	0.0311	0.0012
Greenacre FRNSW	SS02	SS02		20/12/2016	4.8	9.2	9.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<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	0.0213	7.91	<0.0005	0.0368	0.0017	0.0017	0.0077	0.0882
Greenacre FRNSW	SS03	SS03		20/12/2016	1.1	3.3	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0064	0.64	<0.0005	0.0208	0.0016	0.001	0.0035	0.0051

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.

Appendix B
Table A2
Soil analytical results: IMW

										PFAS															
										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	Perfluorododecanoic 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)
										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	0.0002	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	0.0005	0.0002	0.0002	0.0002	0.0002
CRCCare Soil Direct Contact Intrusive Works																														
CRCCare Soil HSL Vap.Int Intrusive Works,0 to <2m,Sand																														
CRCCare Soil HSL Vap.Int Intrusive Works,2 to <4m,Sand																														
Site_ID	**Field_ID**	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**																										
Greenacre FRNSW	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	0.005	0.0035	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0202	0.0014	0.0005	<0.001	<0.0002	0.0002	0.0009	0.0049	<0.0002	0.0199	0.0004	<0.0005	0.0004	<0.0002	0.0605	0.0563
Greenacre FRNSW	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	0.0203	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0013	<0.001	<0.0002	<0.0002	0.0003	0.0047	<0.0002	0.0132	<0.0002	<0.0005	<0.0002	<0.0002	0.0449	0.0427
Greenacre FRNSW	QA04	MW01	5.9-6	19/12/2016	0.0221	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0017	0.0015	<0.001	<0.0002	<0.0002	<0.0002	0.005	<0.0002	0.0111	<0.0002	<0.0005	<0.0002	<0.0002	0.0457	0.0431
Greenacre FRNSW	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	0.0445	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0028	0.0072	0.0044	<0.001	<0.0002	<0.0002	0.0024	0.0062	<0.0002	0.196	<0.0002	<0.0005	<0.0002	<0.0002	0.28	0.265
Greenacre FRNSW	MW02_6.9-7.0	MW02	6.9-7	19/12/2016	0.0021	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0042	<0.0002	<0.0005	<0.0002	<0.0002	0.0076	0.0074
Greenacre FRNSW	QA02	MW02	6.9-7	19/12/2016	<0.005	<0.005	<0.005	<0.01	-	<0.01	-	<0.01	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	-	-
Greenacre FRNSW	MW02_Concrete	MW02		19/12/2016	0.106	0.0121	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0222	0.0115	0.0186	<0.001	<0.0002	<0.0002	0.0068	0.0428	0.0006	0.24	0.0007	<0.0005	<0.0002	<0.0002	0.505	0.476
Greenacre FRNSW	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	0.0067	0.0011	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.003	0.0003	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.0025	<0.0002	0.0164	<0.0002	<0.0005	<0.0002	<0.0002	0.031	0.0307
Greenacre FRNSW	SB01_4.9-5.0	SB01	4.9-5	19/12/2016	0.0054	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	0.0008	<0.001	<0.0002	<0.0002	<0.0002	0.0015	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.0108	0.01
Greenacre FRNSW	SB01_Concrete	SB01		19/12/2016	0.0458	0.0076	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0214	0.0034	0.0145	<0.001	<0.0002	<0.0002	0.0049	0.0334	0.0006	0.0157	<0.0002	<0.0005	<0.0002	<0.0002	0.18	0.163
Greenacre FRNSW	SS02	SS02		20/12/2016	0.321	0.0056	0.22	<0.0005	<0.0005	<0.0005	<0.0005	0.319	0.137	0.0182	<0.001	0.002	0.0009	0.0278	0.0947	0.0006	7.59	0.0092	<0.0005	<0.0002	<0.0002	8.9	8.72
Greenacre FRNSW	SS03	SS03		20/12/2016	0.0379	0.0037	0.0658	<0.0005	<0.0005	<0.0005	<0.0005	0.0468	0.0098	0.0031	<0.001	0.001	0.0004	0.0036	0.0115	0.0005	0.602	0.0066	<0.0005	<0.0002	0.0002	0.831	0.785

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.

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
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	0.01	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 Drinking water guidelines 2017 (based on enHealth) [#1]																			5														50												
NEPM 2013 Table 1C GILs, Fresh Waters [#1]																			*0.0023*														*190*												
WA DER recreational waters guidelines 2017 (based on enHealth) [#1]																			**50**														**500**												
SampleCode	**Field_ID**	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**																																									
ES1700846001	SS02	SS02		20/12/2016	0.09	***77.6***	<0.05	0.2	<0.02	<0.02	0.42	1.54	6.3	0.47	5.32	<0.05	<0.05	<0.05	<0.05	34.6	1.72	0.47	<0.1	<0.02	<0.02	0.3	1.72	0.08	71.3	0.12	<0.05	<0.02	<0.02	125	122
ES1700846002	SS03	SS03		20/12/2016	<0.02	*5.09*	<0.05	<0.05	<0.02	<0.02	<0.02	0.05	0.27	0.04	0.58	<0.05	<0.05	<0.05	<0.05	0.52	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	0.07	<0.02	4.82	0.09	<0.05	<0.02	<0.02	6.48	6.34
ES1700846003	MW02_1.0-1.1	MW02	1-1.1	19/12/2016	<0.02	*4.26*	<0.05	<0.05	<0.02	<0.02	0.08	0.15	0.75	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.06	<0.1	<0.02	<0.02	<0.02	0.08	<0.02	3.51	<0.02	<0.05	<0.02	<0.02	4.73	4.52
ES1700846006	MW02_Concrete	MW02		19/12/2016	<0.02	*10.4*	<0.05	<0.05	<0.02	<0.02	1.22	0.27	4.03	0.28	<0.05	<0.05	<0.05	<0.05	<0.05	1.01	0.33	0.62	<0.1	<0.02	<0.02	0.1	1.22	<0.02	6.4	<0.02	<0.05	<0.02	<0.02	15.5	14.6
ES1700846004	MW01_0.22-0.32	MW01	0.22-0.32	19/12/2016	<0.02	*0.87*	<0.05	<0.05	<0.02	<0.02	0.02	<0.02	0.26	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	0.05	<0.02	<0.1	<0.02	<0.02	0.02	0.23	<0.02	0.61	<0.02	<0.05	<0.02	<0.02	1.48	1.48
ES1700846005	MW01_5.9-6.0	MW01	5.9-6	19/12/2016	<0.02	*0.66*	<0.05	<0.05	<0.02	<0.02	0.07	0.03	0.44	0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	0.04	<0.1	<0.02	<0.02	<0.02	0.12	<0.02	0.22	<0.02	<0.05	<0.02	<0.02	0.98	0.91
ES1700846007	SB01_0.4-0.5	SB01	0.4-0.5	19/12/2016	<0.02	*0.77*	<0.05	<0.05	<0.02	<0.02	0.03	<0.02	0.2	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.02	<0.1	<0.02	<0.02	<0.02	0.09	<0.02	0.57	<0.02	<0.05	<0.02	<0.02	0.97	0.95

Appendix B
Table C
Groundwater analytical results

			Field Parameters						Inorganics			Metals								TRH - NEPM 2013							TRH - NEPM 1999			
			SWL	DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Sulfate as SO4 - Turbidimetric (Filtered)	pH (Lab)	Total Dissolved Solids (Filtered)	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
			m BTOC	mg/L	µS/cm	pH Units	mV	°C	mg/L	pH Units	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
EQL									1	0.01	10	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
CRCCare GW HSL for vap.int Intrusive Maint. - Sand 2-4m																					NL		NL							
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand 2-4m																				*6000 #1*		*NL*								
NEPM 2013 Table 1C GILs, Drinking Water												0.01	0.002 #3		2 #3	0.01 #3	0.001	0.02 #3												
NEPM 2013 Table 1C GILs, Fresh Waters													0.0002 #3		0.0014 #3	0.0034 #3	0.00006 #4	0.011 #3	0.008 #3											
NHMRC Recreational Guidelines 2008												**0.1**	**0.02**		**20**	**0.1**	**0.01**	**0.2**												
Field_ID	**Location_Code**	**Sampled_Date_Time**																												
MW01	MW01	12/01/2017	3.129	0.96	5488	6.83	73.8	25	548	7.63	3550	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.003	<0.005	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50
Repeat test 1	MW01	12/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Repeat test 2	MW01	12/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	MW02	12/01/2017	2.255	0.87	17,698	6.59	-140.9	27.7	662	7.43	12,800	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.009	<0.005	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50
FW01	FW01	20/12/2016	-	1.88	243.3	8.39	108.7	21.6	14	7.7	156	<0.001	0.0002	<0.001	0.016	<0.001	<0.0001	<0.001	0.078	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50
QA101	FW01	19/12/2016	-	-	-	-	-	-	-	-	-	<0.001	<0.0002	<0.001	0.02	<0.001	<0.0001	<0.001	0.081	20	20	<50	<50	<100	<100	-	<20	<50	<100	<100
SW01	SW01	20/12/2016	-	2.26	231	8.3	120.6	20.9	68	8.25	664	0.003	0.0001	<0.001	0.004	<0.001	<0.0001	<0.001	0.021	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50
SW02	SW02	20/12/2016	-	-	-	-	-	-	99	7.55	2550	0.002	0.0048	0.002	0.002	0.006	<0.0001	0.039	0.015	<20	<20	1920	1920	27,000	2490	31,400	<20	430	28,600	3100
SW03	SW03	20/12/2016	-	4.47	209.6	8.19	87.3	20.2	6	7.72	149	<0.001	0.0004	<0.001	0.008	<0.001	<0.0001	0.004	0.142	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50

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: enHealth Interim Human Health PFC Guidelines (Drinking water)
#7: enHealth Interim Human Health PFC Guidelines (Recreational water)

Data Comments

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

			BTEX & MAH							PAH	PFAS																		
			C10 - C36 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Naphthalene	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
			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			50	1	2	2	2	2	2	1	5	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
CRCCare GW HSL for vap.int Intrusive Maint. - Sand 2-4m				NL	NL	NL			NL																				
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand 2-4m				*5000*	*NL*	*NL*			*NL*		*NL*																			
NEPM 2013 Table 1C GILs, Drinking Water				1	800	300			600				0.5 [#6]															5 [#6]		
NEPM 2013 Table 1C GILs, Fresh Waters				950			350				16		0.00023 [#5]															19		
NHMRC Recreational Guidelines 2008				**10**	**8000**	**3000**			**6000**				**5** [#7]															**50** [#7]		
Field_ID	**Location_Code**	**Sampled_Date_Time**																												
MW01	MW01	12/01/2017	<50	<1	<2	<2	<2	<2	<2	<1	<5	<0.02	236	<0.05	<0.05	<0.02	<0.02	9.96	7.05	145	3.66	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	5.24	9.86	1.9
Repeat test 1	MW01	12/01/2017	-	-	-	-	-	-	-	-	-	<0.02	-	<0.05	<0.05	<0.02	<0.02	11.19	8.23	114.37	4.11	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	6.46	10.34	2.5
Repeat test 2	MW01	12/01/2017	-	-	-	-	-	-	-	-	-	<0.02	-	<0.05	<0.05	<0.02	<0.02	10.75	7.52	107.58	3.71	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	5.75	9.26	2.25
MW02	MW02	12/01/2017	<50	<1	<2	<2	<2	<2	<2	<1	<5	<0.1	<0.1	<0.25	<0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.05	<0.1	<0.5
FW01	FW01	20/12/2016	<50	<1	<2	<2	<2	<2	<2	<1	<5	<0.02	0.17	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.18	0.06	<0.02	<0.1
QA101	FW01	19/12/2016	<100	<1	<1	<1	<1	<2	<3	-	<10	<0.01	-	<0.01	-	-	-	<0.01	-	0.02 [#1]	0.03	0.01	<0.05	-	<0.05	-	0.11	0.01 [#1]	-	<0.05
SW01	SW01	20/12/2016	<50	<1	<2	<2	<2	<2	<2	<1	<5	<0.02	17.4	<0.05	<0.05	<0.02	<0.02	1.28	0.36	5.96	2.61	<0.05	<0.05	<0.05	<0.05	<0.05	3.09	0.87	0.82	<0.1
SW02	SW02	20/12/2016	32,100	<1	<2	<2	<2	<2	<2	<1	<5	<0.02	27.2	<0.05	<0.05	<0.02	<0.02	1.07	0.63	6.57	1.93	3.17	<0.05	<0.05	<0.05	<0.05	55.6	3.36	1.04	<0.1
SW03	SW03	20/12/2016	<50	<1	<2	<2	<2	<2	<2	<1	<5	<0.02	5.6	<0.05	<0.05	<0.02	<0.02	1.16	0.1	1.52	0.42	0.26	<0.05	<0.05	<0.05	<0.05	1.35	0.51	0.42	<0.1

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 sit
#4:Chemical for which possible bioaccumulation and secondary poisoning effects should be con
#5: WA DER 2017 - Ecological PFC 99% species protection guidelines
#6: enHealth Interim Human Health PFC Guidelines (Drinking water)
#7: enHealth Interim Human Health PFC Guidelines (Recreational water)

Data Comments

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

Appendix B
Table C
Groundwater analytical results

																	Alkalinity				Major Ions						
			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)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance
			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	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%
EQL			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	1	1	0.01	1	1	0.01	0.01
CRCCare GW HSL for vap.int Intrusive Maint. - Sand 2-4m																										
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand 2-4m																										
NEPM 2013 Table 1C GILs, Drinking Water																										
NEPM 2013 Table 1C GILs, Fresh Waters																										
NHMRC Recreational Guidelines 2008																										
Field_ID	**Location_Code**	**Sampled_Date_Time**																								
MW01	MW01	12/01/2017	<0.02	<0.02	2.15	16.9	<0.02	90.8	<0.02	<0.05	<0.02	<0.02	293	276	<1	<1	613	613	112	1160	95	56.4	7	902	52.8	3.26
Repeat test 1	MW01	12/01/2017	<0.02	<0.02	2.75	18.2	<0.02	77.55	<0.02	<0.05	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Repeat test 2	MW01	12/01/2017	<0.02	<0.02	2.45	19.1	<0.02	71.02	<0.02	<0.05	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	MW02	12/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.25	<0.1	<0.1	<0.1	<0.1	<1	<1	724	724	244	5940	448	196	19	3020	181	3.96
FW01	FW01	20/12/2016	<0.02	<0.02	<0.02	0.04	<0.02	0.17	<0.02	<0.05	<0.02	<0.02	0.5	0.5	<1	<1	51	51	15	33	7	2.24	3	17	2.14	-
QA101	FW01	19/12/2016	<0.01	<0.01	<0.01	0.03	<0.01	0.15[#1]	<0.05	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW01	SW01	20/12/2016	<0.02	<0.02	0.76	3.32	<0.02	11.4	<0.02	<0.05	<0.02	<0.02	30.5	29.3	<1	<1	293	293	101	77	24	9.44	10	66	10.1	3.57
SW02	SW02	20/12/2016	<0.02	<0.02	1.18	11	<0.02	20.6	0.06	<0.05	<0.02	<0.02	106	104	<1	<1	226	226	79	1010	58	35.1	93	663	39.9	6.49
SW03	SW03	20/12/2016	<0.02	<0.02	0.2	1.5	<0.02	4.08	0.03	<0.05	<0.02	<0.02	11.6	11	<1	<1	82	82	31	9	2	2.02	2	6	2.02	-

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 (2000) for sit
#4:Chemical for which possible bioaccumulation and secondary poisoning effects should be con
#5: WA DER 2017 - Ecological PFC 99% species protection guidelines
#6: enHealth Interim Human Health PFC Guidelines (Drinking water)
#7: enHealth Interim Human Health PFC Guidelines (Recreational water)

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

Appendix C - Survey results

CODE	EASTING	NORTHING	AHD (GPS)	DESCRIPTION
MW01	321399.454	6247182.016	26.886	TOP OF CASE
MW01-1	321399.458	6247182.013	26.881	TOP OF GATIC
MW02	321398.73	6247199.458	26.863	TOP OF CASE
MW02-1	321398.829	6247199.456	26.892	TOP OF GATIC

Appendix D – Groundwater database search results

NSW Office of Water
Work Summary

GW112333

Licence: 10BL603796 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Auger - Solid Flight
Owner Type: Private

Commenced Date:
Completion Date: 01/01/2010
Final Depth: 8.63 m
Drilled Depth: 9.50 m

Contractor Name: Soil Check
Driller: Yoon Fook Chin
Assistant Driller:

Property: MIRVAC PROJECTS PTY LIMITED
57 - 67 ROBERTS ROAD
GREENACRE 2190 NSW
Standing Water Level:
GWMA:
GW Zone:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//1149259
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6247137.0
Easting: 321209.0
Latitude: 33°54'03.6"S
Longitude: 151°03'58.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

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

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	8.63	100			Auger - Solid Flight
1		Annulus	Bentonite/Grout	1.90	2.15				
1		Annulus	Waterworn/Rounded	2.15	8.63				Graded
1	1	Casing	Pvc Class 18	0.00	2.63	50			Driven into Hole
1	1	Opening	Slots	2.63	8.63	50		1	Casing - Machine Slotted, PVC Class 18

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.60	2.60	FILL	Fill	

2.60	6.90	4.30	SHALE	Shale	
6.90	9.50	2.60	SANDSTONE	Sandstone	

Remarks

18/07/2014: Nat Carling, 18-July-2014; Changed work type & added status.

***** End of GW112333 *****

NSW Office of Water
Work Summary

GW112334

Licence: 10BL603796 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Auger - Solid Flight
Owner Type: Private

Commenced Date:
Completion Date: 01/01/2010
Final Depth: 9.00 m
Drilled Depth: 11.58 m

Contractor Name: Soil Check
Driller: Yoon Fook Chin
Assistant Driller:

Property: MIRVAC PROJECTS PTY LIMITED
57 - 67 ROBERTS ROAD
GREENACRE 2190 NSW
Standing Water Level:
GWMA:
GW Zone:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//1149259
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6247081.0
Easting: 321113.0
Latitude: 33°54'05.4"S
Longitude: 151°03'55.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

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

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	9.00	100			Auger - Solid Flight
1		Annulus	Bentonite/Grout	2.00	2.50				
1		Annulus	Waterworn/Rounded	2.50	9.00				Graded
1	1	Casing	Pvc Class 18	0.00	3.00	50			Driven into Hole
1	1	Opening	Slots	3.00	9.00	50		1	Casing - Machine Slotted, PVC Class 18

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	FILL	Fill	

0.30	2.00	1.70	SILTY CLAY	Silty Clay	
2.00	8.56	6.56	SHALE	Shale	
8.56	11.58	3.02	SANDSTONE	Sandstone	

Remarks

18/07/2014: Nat Carling, 18-July-2014; Changed work type & added status.

***** End of GW112334 *****

NSW Office of Water
Work Summary

GW112335

Licence: 10BL603796 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Auger - Solid Flight
Owner Type: Private

Commenced Date:
Completion Date: 01/01/2010
Final Depth: 8.80 m
Drilled Depth: 8.80 m

Contractor Name: Soil Check
Driller: Yoon Fook Chin
Assistant Driller:

Property: MIRVAC PROJECTS PTY LIMITED
57 - 67 ROBERTS ROAD
GREENACRE 2190 NSW
Standing Water Level:
GWMA:
GW Zone:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//1149259
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6247050.0
Easting: 321296.0
Latitude: 33°54'06.5"S
Longitude: 151°04'02.1"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

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

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	8.80	100			Auger - Solid Flight
1		Annulus	Bentonite/Grout	4.50	5.00				
1		Annulus	Waterworn/Rounded	5.00	8.80				Graded
1	1	Casing	Pvc Class 18	0.00	5.80	50			Driven into small hole
1	1	Opening	Slots	5.80	8.80	50		1	Casing - Machine Slotted, PVC Class 18

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	FILL	Fill	
0.30	1.00	0.70	SILTY CLAY	Silty Clay	

1.00	5.60	4.60	SHALE	Shale	
5.60	8.80	3.20	SANDSTONE	Sandstone	

Remarks

18/07/2014: Nat Carling, 18-July-2014; Changed work type & added status.

***** End of GW112335 *****

Appendix E – Field sampling sheets and calibration certificates

Purging and Sampling Record

Bore ID: MW01

Job Information		Sampling Information		Bore Information	
Client:	Fire Rescue NSW	Purge Method:	peri-pump	SWL(mbTOC):	3.129m
Project:	21 25583.06	Sample Method:		Screen: From: ..... to ..... m	
Proj. No.:	Greenacre Maintenance centre	WQ Meter Type:	YSI	NAPL Check:	-
Sampler:	AW	Flow Cell: (Y) N	Pump Depth: 5 m	Ref.datum:	TOC
Date:	12/01/17	WLevel Meter Type:	Dip / Fox / (Int.Fce) / Gge	Bore Depth:	6.010 m
Round	1	Field Filtered? (Y) N	(filter vessel, disposable filter/syringe)		

Logic Check: .....
Stick Up: ~-0.1 m gattic
Bore Diam.: 50 mm
Well Cap Secure? Y

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	Dis.Oxygen (ppm)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
12:45	0						BVR		
12:50	0.5	25.8	6.88	6128	1.62	71.0	3.19		clear, colourless, no odour, no sheen
12:54	1.5	25.2	6.85	5661	1.34	79.0	3.29		minimum flow rate
13:01	2.0	24.9	6.85	5547	1.24	80.6	3.35		
13:09	3.0	25.7	6.86	5373	1.23	78.9	3.39		clear
13:22	6.0	25.0	6.84	5374	1.03	74.4	3.45		
13:27	6.5	24.9	6.83	5491	0.96	75.5	3.46		
13:30	7.0	25.0	6.83	5488	0.96	73.8	3.47		

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

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal & metals	Biol.	PFAS	TDS	pH	anions/cations	alk
Preservatives	✓	✓						✓		✓	✓	✓	✓	✓

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

Purge Volumes

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

*Double for gravel pack

5.76L

Purging and Sampling Record

Bore ID: MW02

Job Information		Sampling Information		Bore Information	
Client: FRNSW		Purge Method: peri pump		SWL(mbTOC): 2.255 m	Logic Check:
Project: Greenacre		Sample Method: peri pump		Screen: From: to: m	Stick Up: -0.1 m
Proj. No.: 21255583.06		WQ Meter Type: YSI		NAPL Check: —	Bore Diam.: 50 mm
Sampler: AW		Flow Cell: (Y) / N	Pump Depth: ~5.7 m	Ref.datum: TOC	Well Cap Secure? Y
Date: 12/01/17		WLevel Meter Type:	Dip / Fox / (Int.Fce) / Gge	Bore Depth: 7.742 m	
Round 1		Field Filtered? Y / N (filter vessel, disposable filter/syringe)			

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	Dis.Oxygen (ppm)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
13:59	1.0	24.1	6.73	17920	0.19	-155.5	2.64		initially turbid, cleared → minimised flow rate.
14:04	1.5	27.7	6.69	17529	0.28	-152.6	2.64		clear
14:25	3.5	28.1	6.63	18148	0.79	-140.9	2.72		
14:35	4.5	28.6	6.62	18429	0.84	-125.7	2.71		slightly turbid brown, no odour, no sheen
14:44	6.0	26.5	6.58	17840	0.91	-130.7	2.72		
14:52	7.0	27.7	6.59	17698	0.87	-140.9	2.72		

Field QA Checks:

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

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

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

Purge Volumes

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

*Double for gravel pack 10.9L

LEGEND

- Site Boundary
- Streets
- Major Waterways
- Minor Waterways
- Proposed Monitoring Well (2)
- Proposed Soil Bore (1)
- Proposed Sediment Sample (1)
- Proposed Surface Water Sample (2)
- Proposed Recycled Fire Water Sample (1)

Paper Size A3

0 3.75 7.5 15 22.5 30

Metres

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

N

Fire & Rescue NSW
Greenacre Site Investigation

Job Number	21-25583
Revision	A
Date	09 Aug 2016

Proposed Sample Locations

Figure 5

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

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-105927

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	✓	10.6ev
Alarms	Beeper	✓	**Low** / **High** / **TWA** / **STEL**
	Settings	✓	50ppm / 100ppm / N/A / N/A
Software	Version	✓	
Data logger	Operation	✓	
Download	Operation	✓	
Other tests:			

Certificate of Calibration

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

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		98ppm Isobutylene	NATA	SY137		98.2ppm

Calibrated by: Lin Wang

Calibration date: 16/12/2016

Next calibration due: 15/01/2017

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 13C100781

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		291176	pH 9.72
2. pH 7.00		pH 7.00		288773	pH 7.01
3. pH 4.00		pH 4.00		288994	pH 4.04
4. mV		234.0mV		OB1388/OB1390	233.9mV
5. EC		2.76mS		290786	2.76mS
6. D.O		0.00ppm		4347	0.00ppm
7. Temp		23.0°C		MultiTherm	22.2°C

Calibrated by: **Joanna Wong**

Calibration date: **16/12/2016**

Next calibration due: **15/01/2017**

Oil / Water Interface Meter

Instrument Geotech Interface Meter (30M)
Serial No. 3877

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Calibrated by: Lin Wang **Lin Wang**

Calibration date: **11/01/2017**

Next calibration due: **12/03/2017**

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 09K100887

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		291176	pH 9.63
1. pH 7.00		pH 7.00		288773	pH 6.86
2. pH 4.00		pH 4.00		288994	pH 4.15
3. mV		229.6mV		OB1388/OB1390	229.3mV
4. EC		2.76mS		290786	2.76mS
5. D.O		0.00ppm		4347	0.00ppm
6. Temp		21.7°C		MultiTherm	21.7°C

Calibrated by: Lin Wang

Calibration date: 11/01/2017

Next calibration due: 10/02/2017

cobetter®
— filtration —

Report No.: CY-ICP-MS-D-161022-02
Site/Client Ref: Rinse Analysis
Order No.: 021616091801
Cobetter Filtration Validation Center

CERTIFICATE OF ANALYSIS

SAMPLES: Five filters from Order No. 021616091801

DATE RECEIVED: 21-Oct-2016

DATE COMMENCED: 21-Oct-2016

TEST INSTRUMENT: Agilent ICP-MS 7900

RESULTS: Please refer to attached pages for results

REPORTED BY :

J. N.

ANALYTICAL RESULTS

Matrix: Filter

Sample units are expressed in mg/L

Analyte Name	SGS PQL	Cobetter PQL	Blank	GWQSPSSM0045L				
				1#	2#	3#	4#	5#
Aluminium	0.001	0.0001	nd	nd	nd	nd	nd	nd
Antimony	0.001	0	nd	nd	nd	nd	nd	nd
Arsenic	0.0005	0	nd	nd	nd	nd	nd	nd
Barium	0.001	0.0001	nd	nd	nd	nd	nd	nd
Beryllium	0.001	0	nd	nd	nd	nd	nd	nd
Bismuth	0.01	0	nd	nd	nd	nd	nd	nd
Boron	0.001	0.005	nd	nd	nd	nd	nd	nd
Cadmium	0.0005	0	nd	nd	nd	nd	nd	nd
Calcium	0.01	0.007	nd	nd	nd	nd	nd	nd
Cerium	0.0001	0	nd	nd	nd	nd	nd	nd
Chromium	0.001	0	nd	nd	nd	nd	nd	nd
Cobalt	0.001	0	nd	nd	nd	nd	nd	nd
Copper	0.001	0	nd	nd	nd	nd	nd	nd
Iron	0.001	0	nd	nd	nd	nd	nd	nd
Lead	0.001	0	nd	nd	nd	nd	nd	nd
Magnesium	0.01	0.0005	nd	nd	nd	nd	nd	nd
Manganese	0.001	0	nd	nd	nd	nd	nd	nd
Mercury	0.0002	0	nd	nd	nd	nd	nd	nd
Molybdeum	0.001	0	nd	nd	nd	nd	nd	nd
Nickel	0.001	0	nd	nd	nd	nd	nd	nd
Potassium	0.01	0.002	nd	nd	nd	nd	nd	nd
Selenium	0.001	0.0003	nd	nd	nd	nd	nd	nd
Silicon	0.1	0.05	nd	nd	nd	nd	nd	nd
Silver	0.001	0	nd	nd	nd	nd	nd	nd
Sodium	0.01	0.0009	nd	nd	nd	nd	nd	nd
Strontium	0.001	0	nd	nd	nd	nd	nd	nd
Tellurium	0.001	0	nd	nd	nd	nd	nd	nd
Thallium	0.001	0	nd	nd	nd	nd	nd	nd
Thorium	0.001	0	nd	nd	nd	nd	nd	nd
Tin	0.001	0	nd	nd	nd	nd	nd	nd
Titanium	0.001	0.0001	nd	nd	nd	nd	nd	nd

ANALYTICAL RESULTS

Matrix: Filter

Sample units are expressed in mg/L

Analyte Name	SGS PQL	Cobetter PQL	Blank	GWQSPSSM0045L				
				1#	2#	3#	4#	5#
Uranium	0.001	0	nd	nd	nd	nd	nd	nd
Vanadium	0.001	0	nd	nd	nd	nd	nd	nd
Zinc	0.001	0.0003	nd	nd	nd	nd	nd	nd
Caesium	0.0001	0	nd	nd	nd	nd	nd	nd
Germanium	0.0001	0	nd	nd	nd	nd	nd	nd
Lanthanum	0.0001	0	nd	nd	nd	nd	nd	nd
Lithium	0.01	0	nd	nd	nd	nd	nd	nd
Niobium	0.0001	0	nd	nd	nd	nd	nd	nd
Tungsten	0.01	0	nd	nd	nd	nd	nd	nd
Zirconium	0.001	0	nd	nd	nd	nd	nd	nd

QUALIFIERS/NOTES FOR REPORTED RESULTS

PQL Practical Quantitation Limit

nd Not Detected – The analyte was not detected above the reported PQL

Appendix F – Borehole logs

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW01

Client Fire & Rescue NSW
Project Greenacre FRNSW Site Investigation
Project No. 212558306
Site Greenacre FRNSW
Location 1 Amarina Avenue, Greenacre NSW 2190
Date Drilled 19/12/2016 - 19/12/2016

Drill Co. Terratest
Driller Dan Jones
Rig Type Geoprobe
Drill Method HA, PT & SFA
Total Depth (m) 6
Diameter (mm) 125

Easting, Northing 321399.454, 6247182.016
Grid Ref GDA94_MGA_zone_56
Elevation 26.886
Collar RL -
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)
0	HA	2.8	MW01_0.22-0.32				CONCRETE				26.886
0.5		0.4	MW01_0.4-0.5				gravelly SAND, fine, poorly graded, subangular, grey and pale brown, coarse gravel (FILL)	M	MD	weak hydrocarbon odour, hydrocarbon staining	26.5
1	PT	0	MW01_1.0-1.1		Cement / Backfill		CLAY, low to medium plasticity, red-orange and grey (NATURAL - SOIL)	SM	ST		26
1.5							sandy CLAY, low to medium plasticity, pale grey, fine, poorly graded sand (NATURAL - SOIL)	SM	ST		25.5
2		0	MW01_2.0-2.1		Bentonite						25
2.5	SFA						gravelly SAND, fine, brown, subangular, medium to coarse, poorly graded gravel (NATURAL - SOIL)	SM			24.5
3		0	MW01_2.9-3.0								24
3.5							gravelly SAND, fine, pale grey, subangular, medium to coarse, poorly graded gravel (NATURAL - SOIL)	D			23.5
4		0	MW01_3.9-4.0		Gravel						23
4.5				▽			gravelly CLAY, low to medium plasticity, brown, fine sand, subangular, medium to coarse, poorly graded gravel (NATURAL - SOIL)	VM	ST		22.5
5		0	MW01_4.9-5.0								22
5.5											21.5
6		0	MW01_5.9-6.0 (QA04)				Termination Depth at:6.00 m. Target depth achieved.				21
6.5											20.5
7											20
7.5											19.5
											19

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 MW02

Client Fire & Rescue NSW
Project Greenacre FRNSW Site Investigation
Project No. 212558306
Site Greenacre FRNSW
Location 1 Amarina Avenue, Greenacre NSW 2190
Date Drilled 19/12/2016 - 19/12/2016

Drill Co. Terratest
Driller Dan Jones
Rig Type Geoprobe
Drill Method HA, PT & SFA
Total Depth (m) 8
Diameter (mm) 125

Easting, Northing 321398.73, 6247199.458
Grid Ref GDA94_MGA_zone_56
Elevation 26.863
Collar RL -
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)
0	HA	0	MW02_0.24-0.34		Cement		CONCRETE				26.5
0.5		0	MW02_0.6-0.7				gravelly SAND, fine, pale brown, angular, coarse, poorly graded gravel (FILL)	SM	MD		
1		0	MW02_1.0-1.1		Backfill		gravelly CLAY, medium to high plasticity, olive- brown, angular, fine to medium, poorly graded gravel (FILL)	M	S		26
	PT						CLAY, medium to high plasticity, orange-red and grey (NATURAL - SOIL)	SM	ST		
1.5							gravelly CLAY, low to medium plasticity, grey- orange, platy, fine to medium, poorly graded gravel (NATURAL - SOIL)	SM	VST		25.5
2	SFA	0	MW02_1.8-1.9		Bentonite		gravelly CLAY, medium to high plasticity, brown, subangular, fine to medium, poorly graded gravel (NATURAL - SOIL)	D	ST		25
2.5											24.5
3		0	MW02_2.9-3.0								24
3.5											23.5
4		0	MW02_3.9-4.0				gravelly SAND, fine, pale brown- grey, subangular, fine to medium, poorly graded gravel (NATURAL - SOIL)	D			23
4.5											22.5
5		0	MW02_4.9-5.0		Gravel						22
5.5							gravelly SAND, fine, dark grey- brown, subangular, medium to coarse, poorly graded gravel (NATURAL - SOIL)	SM			21.5
6		0	MW02_5.9-6.0 (QA01)								21
6.5				▽			gravelly CLAY, low to medium plasticity, brown, subangular, fine to medium, poorly graded gravel (NATURAL - SOIL)	VM	F		20.5
7		0	MW02_6.9-7.0 (QA02)								20
7.5											19.5
8		0	MW02_7.9-8.0 (QA03)				Termination Depth at:8.00 m. Target depth achieved.				19
											18.5

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 SB01

Client Fire & Rescue NSW
Project Greenacre FRNSW Site Investigation
Project No. 212558306
Site Greenacre FRNSW
Location 1 Amarina Avenue, Greenacre NSW 2190
Date Drilled 19/12/2016 - 19/12/2016

Drill Co. Terratest
Driller Dan Jones
Rig Type Geoprobe
Drill Method HA, PT & 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)
0	HA	0.1	SB01_0.18-0.28			CONCRETE	W	MD		0
0.5		0	SB01_0.4-0.5			GP - GRAVEL, poorly graded, angular, grey Poorly graded gravel (FILL)	M	ST		-0.5
	PT					CLAY, low to medium plasticity, red- orange and grey (NATURAL - SOIL)	SM	ST		
1		0	SB01_1.0-1.1			sandy CLAY, low plasticity, grey- orange, fine, poorly graded sand (NATURAL - SOIL)				-1
1.5		0.2	SB01_1.6-1.7							-1.5
	SFA					sandy CLAY, low to medium plasticity, brown, fine to medium sand (NATURAL - SOIL)	M	F		
2										-2
2.5										-2.5
3		0.2	SB01_2.9-3.0							-3
3.5										-3.5
4		0.1	SB01_3.9-4.0							-4
4.5										-4.5
5		0	SB01_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

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

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka 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	TURNAROUND REQUIREMENT ☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: Sydney	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT: 21-25583-06 Greenacre	ALS QUOTE NO.: EN/005/16	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:	12.2 °C
PROJECT MANAGER: Ben Anderson / Nicole Rosen	CONTACT PH: 02 9239 7170 / 0408 713 343	Other comment:	
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 nicole.rosen@ghd.com terry.nham@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed):			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)			Helen - ALS
DATE/TIME: 20/12/2016	DATE/TIME:	DATE/TIME:	DATE/TIME: 20-12-16 12:10 pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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).

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		PFAS (Full Suite)	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TRH, BTEX, PAH (Suite S-7 / W-7)	TOC	CEC	pH	TDS	Major Anions / Cations	Alkalinity	HT
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS										
18	MW02_0.24-0.34	19/12/16	Soil		2										
19	MW02_0.6-0.7														
1	MW02_1.0-1.1					X		X	X	X	X				
20	MW02_1.8-1.9														
21	MW02_2.9-3.0														
22	MW02_3.9-4.0														
23	MW02_4.9-5.0														
24	MW02_5.9-6.0														
2	MW02_6.9-7.0					X		X	X	X	X				
25	MW02_7.9-8.0														
26	QA01														
—	QA02														
					TOTAL	Please send to Eurofins with the attached COC.									

Environmental Division
Sydney
Work Order Reference
ES1629370

Telephone : + 61-2-8784 8555

Silcon / Forward Lab / Split WO
Lab / Analysis: Eurofins → QA02 + QA101
Organised By / Date:
Relinquished By / Date:
Courier / Courier: Brisbane → Crushing
WO No: ES1629370
Attach By PO / Internal Sheet: SOL_Concrete

MW01_Concrete,
MW02_Concrete,

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 Pooraka 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	TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☒ Standard TAT (List due date):
OFFICE: Sydney		☐ Non Standard or urgent TAT (List due date):
PROJECT: 21-25583-06 Greenacre	ALS QUOTE NO.: EN/005/16	COC SEQUENCE NUMBER (Circle) COC: 1 (2) 3 4 5 6 7
ORDER NUMBER:		OF: 1 2 3 (4) 5 6 7
PROJECT MANAGER: Ben Anderson / Nicole Rosen	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 nicole.rosen@ghd.com terry.nham@ghd.com		
Email Invoice to (will default to PM if no other addresses are listed):		

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: 12.2 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)			Helen -ALS
DATE/TIME: 20/12/2016	DATE/TIME:	DATE/TIME:	DATE/TIME: 20-12-16 12.10pm

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	PFAS (Full Suite)	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TRH, BTEX, PAH (Suite S-7 / W-7)	TOC	CEC	pH	TDS	Major Anions / Cations	Alkalinity																
(27)	QA03	19/12/16	Soil		2																									
3	MW01_0.22-0.32					X		X	X	X	X																			
(28)	MW01_0.4-0.5																													
(29)	MW01_2.0-2.1																													
(30)	MW01_2.9-3.0																													
(31)	MW01_3.9-4.0																													
(32)	MW01_4.9-5.0																													
4	MW01_5.9-6.0					X		X	X	X	X																			
5	QA04					X		X																						
(33)	SB01_0.18-0.28																													
6	SB01_0.4-0.5					X		X	X	X	X																			
(34)	SB01_1.0-1.1																													
				TOTAL																										

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka [illegible]95
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

☐NEWCAS[illegible] Rose Gum Road Warabrook NSW 2304
Ph: 02 4968 [illegible] 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	TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Sydney		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes (No) N/A
PROJECT: 21-25583-06 Greenacre	ALS QUOTE NO.: EN/005/16	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? (Yes) No N/A
ORDER NUMBER:		COC: 1 2 (3) 4 5 6 7	Random Sample Temperature on Receipt: 12.2 °C
PROJECT MANAGER: Ben Anderson / Nicole Rosen	CONTACT PH: 02 9239 7170 / 0408 713 343	OF: 1 2 3 (4) 5 6 7	Other comment:
SAMPLER: Terry Nham	SAMPLER MOBILE: 0403 251 883	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	Terry Nham (GHD)	RELINQUISHED BY:
Email Reports to: ben.anderson@ghd.com nicole.rosen@ghd.com terry.nham@ghd.com		DATE/TIME: 20/12/2016	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):		DATE/TIME:	RECEIVED BY: Helen - ALS
			DATE/TIME: 20-12-16 12-10pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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).

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		PFAS (Full Suite)	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TRH, BTEX, PAH (Suite S-7 / W-7)	TOC	CEC	pH	TDS	Major Anions / Cations	Alkalinity	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS										
(35)	SB01_1.6-1.7	19/12/16	Soil		2										
(36)	SB01_2.9-3.0														
(37)	SB01_3.9-4.0														
7	SB01_4.9-5.0					X		X	X	X	X				
(38)	QA05														
8	WC01						X								
9	WC02						X								
(39)	MW01_Concrete	19/12/16	Concrete Core		1										Please crush the top 10cm of the core before analysis.
10	MW02_Concrete				1	X									
11	SB01_Concrete				1	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 Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka, [illegible]95
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

☐NEWCAS[illegible] 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	TURNAROUND REQUIREMENT ☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle):
OFFICE: Sydney	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / N/A
PROJECT: 21-25583-06 Greenacre	ALS QUOTE NO.: EN/005/16	COC SEQUENCE NUMBER (Circle): COC: 1 2 3 (4) 5 6 7
ORDER NUMBER:		OF: 1 2 3 (4) 5 6 7
PROJECT MANAGER: Ben Anderson / Nicole Rosen	CONTACT PH: 02 9239 7170 / 0408 713 343	Ice bag / frozen ice bricks present upon receipt? Yes / No / N/A
SAMPLER: Terry Nham	SAMPLER MOBILE: 0403 251 883	Random Sample Temperature on Receipt: 12.2 °C
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	Other comment:
Email Reports to: ben.anderson@ghd.com nicole.rosen@ghd.com terry.nham@ghd.com		
Email Invoice to (will default to PM if no other addresses are listed):		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Terry Nham (GHD)			Helen - ALS.
DATE/TIME: 20/12/2016	DATE/TIME:	DATE/TIME:	DATE/TIME: 20-12-16 12.10pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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).

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		PFAS (Full Suite)	TRH, BTEX, PAH, 8 Metals (Suite S-26 / W-26)	TRH, BTEX, PAH (Suite S-7 / W-7)	TOC	CEC	pH	TDS	Major Anions / Cations	Alkalinity	TRH/BTEX Suite	8 Metals										
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS																					
12	FW01	20/12/16	Water		8	X					X	X	X	X	X	X										
13	SW01				8	X					X	X	X	X	X	X										
14	SW02				8	X					X	X	X	X	X	X										
15	SW03				8	X					X	X	X	X	X	X										
—	QA101				8	Please send to Eurofins with attached COC.																				
16	SS02		Soil		2	X		X	X		X															
17	SS03				2	X		X	X		X															
(40)	MW01_1.0-1.1 Extra sample received																									
				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.

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 :	**Project Manager :** Ben Anderson / Nicole Rosen	**PROJECT Number :** 21-25583-06	**Eurofins | mgt quote ID :** GHD Rates 2016
Level 15, 133 Castlereagh Street, Sydney NSW 2000	**Email for results :** terry.nham@ghd.com ben.anderson@ghd.com nicole.rosen@ghd.com	**PROJECT Name :** Greenacre	**Data output format:** ESDAT

Special Directions & Comments :

Eurofins | mgt DI water batch number:

Analytes

	Sample ID	Date	Matrix	PFOS/PFOA Suite	TRH, BTEX, PAH, 8M (Suite B7)	TRH, BTEX, PAH (Suite B4)	TRH / BTEX Suite 8 Metals
1	BA02	19/12/16	Soil	X		X	
2	BA101	20/12/16	Water	X			X X
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 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

Containers:

	500P	250P	60P	200A	40mL vial	125mL A	Jar	Bag
1							2	
2	2		2	1	2			

Sample comments:

Laboratory Staff

Relinquished By: Terry Nham - GHD
Date & Time : 20/12/2016
Signature:

Received By: Helen - ALS
Date & Time : 20-12-16 12:10pm
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:

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1629370**	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 07 5413 8161	Telephone	: +61-2-8784 8555
Project	: 21-25583-06 Greenacre	Date Samples Received	: 20-Dec-2016 12:10
Order number	: ----	Date Analysis Commenced	: 20-Dec-2016
C-O-C number	: ----	Issue Date	: 04-Jan-2017 13:38
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 40		
No. of samples analysed	: 17		

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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MW02_1.0-1.1	MW02_6.9-7.0	MW01_0.22-0.32	MW01_5.9-6.0	QA04
			Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1629370-001	ES1629370-002	ES1629370-003	ES1629370-004	ES1629370-005
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.1	9.2	9.0	9.1	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	19.8	8.2	17.5	14.9	16.4
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	2.1	3.7	2.9	----
Exchangeable Magnesium	----	0.2	meq/100g	----	2.9	0.5	3.0	----
Exchangeable Potassium	----	0.2	meq/100g	----	0.4	<0.2	0.3	----
Exchangeable Sodium	----	0.2	meq/100g	----	1.7	<0.2	1.9	----
Cation Exchange Capacity	----	0.2	meq/100g	----	7.1	4.4	8.0	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	1.3	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	11.7	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	4.3	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	17.7	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	----
Chromium	7440-47-3	2	mg/kg	----	----	----	----	----
Copper	7440-50-8	5	mg/kg	----	----	----	----	----
Lead	7439-92-1	5	mg/kg	----	----	----	----	----
Nickel	7440-02-0	2	mg/kg	----	----	----	----	----
Zinc	7440-66-6	5	mg/kg	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.7	0.6	<0.5	0.7	----
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW02_1.0-1.1	MW02_6.9-7.0	MW01_0.22-0.32	MW01_5.9-6.0	QA04
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-001	ES1629370-002	ES1629370-003	ES1629370-004	ES1629370-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW02_1.0-1.1	MW02_6.9-7.0	MW01_0.22-0.32	MW01_5.9-6.0	QA04
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-001	ES1629370-002	ES1629370-003	ES1629370-004	ES1629370-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
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		**0.0043**	**0.0003**	**0.0005**	**0.0020**	**0.0023**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0044**	**0.0002**	**0.0005**	**0.0013**	**0.0015**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0445**	**0.0021**	**0.0050**	**0.0203**	**0.0221**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		**0.0101**	<0.0002	**0.0008**	**0.0009**	**0.0011**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.196**	**0.0042**	**0.0199**	**0.0132**	**0.0111**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	**0.0009**	<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		**0.0016**	<0.0002	**0.0035**	**0.0008**	**0.0009**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0062**	**0.0005**	**0.0049**	**0.0047**	**0.0050**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0024**	<0.0002	**0.0009**	**0.0003**	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0072**	**0.0003**	**0.0014**	**0.0014**	**0.0017**
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	**0.0004**	<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									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW02_1.0-1.1	MW02_6.9-7.0	MW01_0.22-0.32	MW01_5.9-6.0	QA04
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-001	ES1629370-002	ES1629370-003	ES1629370-004	ES1629370-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	**0.0004**	<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		**0.0028**	<0.0005	**0.0202**	<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	**0.0010**	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.280**	**0.0076**	**0.0605**	**0.0449**	**0.0457**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.240**	**0.0063**	**0.0249**	**0.0335**	**0.0332**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.265**	**0.0074**	**0.0563**	**0.0427**	**0.0431**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**94.5**	**87.8**	**93.3**	**96.2**	**80.0**
2-Chlorophenol-D4	93951-73-6	0.5	%		**92.9**	**90.8**	**98.6**	**91.9**	**93.0**
2.4.6-Tribromophenol	118-79-6	0.5	%		**80.5**	**84.9**	**80.4**	**82.7**	**78.0**
EP075(SIM)T: PAH Surrogates									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW02_1.0-1.1	MW02_6.9-7.0	MW01_0.22-0.32	MW01_5.9-6.0	QA04
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-001	ES1629370-002	ES1629370-003	ES1629370-004	ES1629370-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
2-Fluorobiphenyl	321-60-8	0.5	%		92.4	102	96.4	101	102
Anthracene-d10	1719-06-8	0.5	%		103	106	104	104	105
4-Terphenyl-d14	1718-51-0	0.5	%		103	109	104	107	107
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		95.6	116	90.4	106	78.4
Toluene-D8	2037-26-5	0.2	%		98.3	120	108	112	80.6
4-Bromofluorobenzene	460-00-4	0.2	%		107	125	102	115	88.0
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		115	108	85.7	89.4	118

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB01_0.4-0.5	SB01_4.9-5.0	WC01	WC02	MW02_Concrete
			Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1629370-006	ES1629370-007	ES1629370-008	ES1629370-009	ES1629370-010
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.2	9.3	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	19.6	8.2	7.6	19.8	4.1
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	3.2	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g	----	3.1	----	----	----
Exchangeable Potassium	----	0.2	meq/100g	----	<0.2	----	----	----
Exchangeable Sodium	----	0.2	meq/100g	----	2.6	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g	----	9.1	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	3.4	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	7.1	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.2	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	3.4	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	14.2	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	8	12	----
Cadmium	7440-43-9	1	mg/kg	----	----	<1	<1	----
Chromium	7440-47-3	2	mg/kg	----	----	6	7	----
Copper	7440-50-8	5	mg/kg	----	----	13	20	----
Lead	7439-92-1	5	mg/kg	----	----	14	14	----
Nickel	7440-02-0	2	mg/kg	----	----	15	22	----
Zinc	7440-66-6	5	mg/kg	----	----	82	105	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	<0.1	<0.1	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	<0.5	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB01_0.4-0.5	SB01_4.9-5.0	WC01	WC02	MW02_Concrete
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-006	ES1629370-007	ES1629370-008	ES1629370-009	ES1629370-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB01_0.4-0.5	SB01_4.9-5.0	WC01	WC02	MW02_Concrete
			Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1629370-006	ES1629370-007	ES1629370-008	ES1629370-009	ES1629370-010
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0007**	**0.0014**	----	----	**0.0346**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0003**	**0.0008**	----	----	**0.0186**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0067**	**0.0054**	----	----	**0.106**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	**0.0095**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0164**	**0.0010**	----	----	**0.240**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<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
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0011**	**0.0004**	----	----	**0.0121**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0025**	**0.0015**	----	----	**0.0428**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	**0.0068**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0003**	**0.0003**	----	----	**0.0115**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	**0.0006**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB01_0.4-0.5	SB01_4.9-5.0	WC01	WC02	MW02_Concrete
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-006	ES1629370-007	ES1629370-008	ES1629370-009	ES1629370-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	**0.0007**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	<0.0002
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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		**0.0030**	<0.0005	----	----	**0.0222**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0310**	**0.0108**	----	----	**0.505**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0231**	**0.0064**	----	----	**0.346**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0307**	**0.0100**	----	----	**0.476**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**97.1**	**91.0**	**91.3**	**90.4**	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**89.2**	**83.8**	**81.0**	**88.5**	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**73.1**	**71.8**	**77.8**	**77.2**	----
EP075(SIM)T: PAH Surrogates									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB01_0.4-0.5	SB01_4.9-5.0	WC01	WC02	MW02_Concrete
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629370-006	ES1629370-007	ES1629370-008	ES1629370-009	ES1629370-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
2-Fluorobiphenyl	321-60-8	0.5	%		97.2	100	101	104	----
Anthracene-d10	1719-06-8	0.5	%		100	103	101	95.4	----
4-Terphenyl-d14	1718-51-0	0.5	%		104	111	101	110	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		110	104	104	80.2	----
Toluene-D8	2037-26-5	0.2	%		113	102	106	86.7	----
4-Bromofluorobenzene	460-00-4	0.2	%		119	104	104	87.6	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		92.3	73.4	----	----	90.3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB01_Concrete	SS02	SS03	----	----
			Client sampling date / time	19-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1629370-011	ES1629370-016	ES1629370-017	--------	--------
				Result	Result	Result	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	----	7.5	7.6	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	6.1	1.5	39.0	----	----
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	----
Chromium	7440-47-3	2	mg/kg	----	----	----	----	----
Copper	7440-50-8	5	mg/kg	----	----	----	----	----
Lead	7439-92-1	5	mg/kg	----	----	----	----	----
Nickel	7440-02-0	2	mg/kg	----	----	----	----	----
Zinc	7440-66-6	5	mg/kg	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	13.3	5.1	----	----
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	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB01_Concrete	SS02	SS03	----	----
				Client sampling date / time	19-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1629370-011	ES1629370-016	ES1629370-017	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluoranthene	206-44-0	0.5	mg/kg		----	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg		----	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		----	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		----	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		----	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		----	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		----	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		----	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	**0.6**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		----	**16**	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		----	**100**	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		----	**9950**	**630**	----	----
C29 - C36 Fraction	----	100	mg/kg		----	**5760**	**710**	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	**15800**	**1340**	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		----	**18**	**13**	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		----	<10	**10**	----	----
>C10 - C16 Fraction	----	50	mg/kg		----	**190**	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		----	**14000**	**1180**	----	----
>C34 - C40 Fraction	----	100	mg/kg		----	**3080**	**400**	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	**17300**	**1580**	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		----	**190**	<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		----	**0.6**	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	**4.8**	**1.1**	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SB01_Concrete	SS02	SS03	----	----
			Client sampling date / time	19-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1629370-011	ES1629370-016	ES1629370-017	--------	--------
				Result	Result	Result	----	----
EP080: BTEXN - Continued								
ortho-Xylene	95-47-6	0.5	mg/kg	----	**4.4**	**2.2**	----	----
^ Sum of BTEX	----	0.2	mg/kg	----	**9.8**	**3.3**	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	**9.2**	**3.3**	----	----
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0311**	**0.0077**	**0.0035**	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0145**	**0.0182**	**0.0031**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0458**	**0.321**	**0.0379**	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0012**	**0.0882**	**0.0051**	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0157**	**7.59**	**0.602**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	**0.0213**	**0.0064**	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0076**	**0.0056**	**0.0037**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0334**	**0.0947**	**0.0115**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0049**	**0.0278**	**0.0036**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0034**	**0.137**	**0.0098**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0006**	**0.0006**	**0.0005**	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	**0.0020**	**0.0010**	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	**0.0002**	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	**0.0009**	**0.0004**	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB01_Concrete	SS02	SS03	----	----
				Client sampling date / time	19-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1629370-011	ES1629370-016	ES1629370-017	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	**0.0092**	**0.0066**	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	**0.0017**	**0.0010**	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	**0.0017**	**0.0016**	----	----
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	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		**0.0214**	**0.319**	**0.0468**	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	**0.220**	**0.0658**	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	**0.0368**	**0.0208**	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.180**	**8.90**	**0.831**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0615**	**7.91**	**0.640**	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.163**	**8.72**	**0.785**	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	**83.3**	**82.0**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		----	**96.6**	**97.8**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		----	**87.0**	**88.7**	----	----
EP075(SIM)T: PAH Surrogates									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB01_Concrete	SS02	SS03	----	----
				Client sampling date / time	19-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1629370-011	ES1629370-016	ES1629370-017	--------	--------
					Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates - Continued									
2-Fluorobiphenyl	321-60-8	0.5	%		----	**93.6**	**95.6**	----	----
Anthracene-d10	1719-06-8	0.5	%		----	**93.4**	**95.4**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		----	**85.9**	**97.9**	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		----	**85.8**	**86.4**	----	----
Toluene-D8	2037-26-5	0.2	%		----	**103**	**91.8**	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		----	**95.1**	**95.0**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**83.2**	**85.0**	**96.7**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	FW01	SW01	SW02	SW03	----
			Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----
Compound	CAS Number	LOR	Unit	ES1629370-012	ES1629370-013	ES1629370-014	ES1629370-015	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.70	8.25	7.55	7.72	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	156	664	2550	149	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	51	293	226	82	----
Total Alkalinity as CaCO3	----	1	mg/L	51	293	226	82	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	68	99	6	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	33	77	1010	9	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	15	101	79	31	----
Magnesium	7439-95-4	1	mg/L	7	24	58	2	----
Sodium	7440-23-5	1	mg/L	17	66	663	6	----
Potassium	7440-09-7	1	mg/L	3	10	93	2	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.003	0.002	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0001	0.0048	0.0004	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.002	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.016	0.004	0.002	0.008	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.039	0.004	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.006	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.078	0.021	0.015	0.142	----
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	2.24	9.44	35.1	2.02	----
Total Cations	----	0.01	meq/L	2.14	10.1	39.9	2.02	----
Ionic Balance	----	0.01	%	----	3.57	6.49	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	430	<50	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FW01	SW01	SW02	SW03	----
				Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----
Compound	CAS Number	LOR	Unit		ES1629370-012	ES1629370-013	ES1629370-014	ES1629370-015	--------
					Result	Result	Result	Result	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C15 - C28 Fraction	----	100	µg/L		<100	<100	**28600**	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	**3100**	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	**32100**	<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	**1920**	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	**27000**	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	**2490**	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	**31400**	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	**1920**	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	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		<0.02	**1.28**	**1.07**	**1.16**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	**0.82**	**1.04**	**0.42**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	**5.96**	**6.57**	**1.52**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	**0.36**	**0.63**	**0.10**	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.17**	**11.4**	**20.6**	**4.08**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FW01	SW01	SW02	SW03	----
				Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----
Compound	CAS Number	LOR	Unit		ES1629370-012	ES1629370-013	ES1629370-014	ES1629370-015	--------
					Result	Result	Result	Result	----
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		**0.05**	**2.61**	**1.93**	**0.42**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.04**	**3.32**	**11.0**	**1.50**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.76**	**1.18**	**0.20**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.06**	**0.87**	**3.36**	**0.51**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<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	----
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		<0.02	<0.02	**0.06**	**0.03**	----
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	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FW01	SW01	SW02	SW03	----
				Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	20-Dec-2016 00:00	----
Compound	CAS Number	LOR	Unit		ES1629370-012	ES1629370-013	ES1629370-014	ES1629370-015	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.18**	**3.09**	**55.6**	**1.35**	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	**3.17**	**0.26**	----
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		**0.50**	**30.5**	**106**	**11.6**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.17**	**17.4**	**27.2**	**5.60**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.50**	**29.3**	**104**	**11.0**	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**108**	**116**	**108**	----
Toluene-D8	2037-26-5	2	%		**110**	**101**	**113**	**103**	----
4-Bromofluorobenzene	460-00-4	2	%		**101**	**96.2**	**106**	**95.0**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**126**	**105**	**95.1**	**123**	----

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

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1629370**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: 21-25583-06 Greenacre	Date Samples Received	: 20-Dec-2016
Site	: ----	Issue Date	: 04-Jan-2017
Sampler	: TERRY NHAM	No. of samples received	: 40
Order number	: ----	No. of samples analysed	: 17

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							
EG005T: Total Metals by ICP-AES	ES1629294--001	Anonymous	**Cadmium**	7440-43-9	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	ES1629294--001	Anonymous	**Chromium**	7440-47-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	ES1629294--001	Anonymous	**Copper**	7440-50-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	ES1629294--001	Anonymous	**Lead**	7439-92-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005T: Total Metals by ICP-AES	ES1629294--001	Anonymous	**Zinc**	7440-66-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP004: Organic Matter	ES1629287--019	Anonymous	**Organic Matter**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1629287--002	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1629287--002	Anonymous	**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	ES1629370--013	SW01	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1615490--001	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1615490--001	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1615490--001	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	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 - Continued							
EP231A: Perfluoroalkyl Sulfonic Acids	EM1615490--001	Anonymous	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1615490--001	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1615490--001	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1615490--001	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1615490--001	Anonymous	**Perfluoroheptanoic acid (PFHpA)**	375-85-9	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1615490--001	Anonymous	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM1615490--001	Anonymous	**6:2 Fluorotelomer sulfonic acid (6:2 FTS)**	27619-97-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM1615490--001	Anonymous	**8:2 Fluorotelomer sulfonic acid (8:2 FTS)**	39108-34-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
MW02_1.0-1.1, MW01_0.22-0.32, SB01_0.4-0.5, MW02_6.9-7.0, MW01_5.9-6.0, SB01_4.9-5.0	**19-Dec-2016**	**21-Dec-2016**	26-Dec-2016	✓	**21-Dec-2016**	21-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA002)							
SS02, SS03	**20-Dec-2016**	**21-Dec-2016**	27-Dec-2016	✓	**21-Dec-2016**	21-Dec-2016	✓
EA055: Moisture Content							
Plastic Bag (EA055-103)							
MW02_Concrete, SB01_Concrete	**19-Dec-2016**	**----**	----	----	**21-Dec-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EA055-103)							
MW02_1.0-1.1, MW01_0.22-0.32, QA04, SB01_4.9-5.0, WC02, MW02_6.9-7.0, MW01_5.9-6.0, SB01_0.4-0.5, WC01,	**19-Dec-2016**	**----**	----	----	**21-Dec-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EA055-103)							
SS02, SS03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	03-Jan-2017	✓
ED006: Exchangeable Cations on Alkaline Soils							
Soil Glass Jar - Unpreserved (ED006)							
MW02_6.9-7.0, MW01_5.9-6.0, MW01_0.22-0.32, SB01_4.9-5.0	**19-Dec-2016**	**29-Dec-2016**	16-Jan-2017	✓	**29-Dec-2016**	16-Jan-2017	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
MW02_1.0-1.1, SB01_0.4-0.5	**19-Dec-2016**	**29-Dec-2016**	16-Jan-2017	✓	**29-Dec-2016**	16-Jan-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
WC01, WC02	**19-Dec-2016**	**22-Dec-2016**	17-Jun-2017	✓	**22-Dec-2016**	17-Jun-2017	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
WC01, WC02	**19-Dec-2016**	**22-Dec-2016**	16-Jan-2017	✓	**22-Dec-2016**	16-Jan-2017	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
MW02_1.0-1.1, MW01_0.22-0.32, SB01_0.4-0.5, MW02_6.9-7.0, MW01_5.9-6.0, SB01_4.9-5.0	**19-Dec-2016**	**30-Dec-2016**	16-Jan-2017	✓	**30-Dec-2016**	16-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP004)							
SS02, SS03	**20-Dec-2016**	**30-Dec-2016**	17-Jan-2017	✓	**30-Dec-2016**	17-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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
MW02_1.0-1.1,	MW02_6.9-7.0,	**19-Dec-2016**	**21-Dec-2016**	02-Jan-2017	✓	**21-Dec-2016**	30-Jan-2017	✓
MW01_0.22-0.32,	MW01_5.9-6.0,							
QA04,	SB01_0.4-0.5,							
SB01_4.9-5.0,	WC01,							
WC02								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SS02,	SS03	**20-Dec-2016**	**21-Dec-2016**	03-Jan-2017	✓	**21-Dec-2016**	30-Jan-2017	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
MW02_1.0-1.1,	MW02_6.9-7.0,	**19-Dec-2016**	**21-Dec-2016**	02-Jan-2017	✓	**21-Dec-2016**	02-Jan-2017	✓
MW01_0.22-0.32,	MW01_5.9-6.0,							
QA04,	SB01_0.4-0.5,							
SB01_4.9-5.0,	WC01,							
WC02								
Soil Glass Jar - Unpreserved (EP080)								
SS02,	SS03	**20-Dec-2016**	**21-Dec-2016**	03-Jan-2017	✓	**21-Dec-2016**	03-Jan-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
MW02_1.0-1.1,	MW02_6.9-7.0,	**19-Dec-2016**	**21-Dec-2016**	02-Jan-2017	✓	**21-Dec-2016**	02-Jan-2017	✓
MW01_0.22-0.32,	MW01_5.9-6.0,							
QA04,	SB01_0.4-0.5,							
SB01_4.9-5.0,	WC01,							
WC02								
Soil Glass Jar - Unpreserved (EP080)								
SS02,	SS03	**20-Dec-2016**	**21-Dec-2016**	03-Jan-2017	✓	**21-Dec-2016**	03-Jan-2017	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
MW02_1.0-1.1,	MW02_6.9-7.0,	**19-Dec-2016**	**21-Dec-2016**	02-Jan-2017	✓	**21-Dec-2016**	02-Jan-2017	✓
MW01_0.22-0.32,	MW01_5.9-6.0,							
QA04,	SB01_0.4-0.5,							
SB01_4.9-5.0,	WC01,							
WC02								
Soil Glass Jar - Unpreserved (EP080)								
SS02,	SS03	**20-Dec-2016**	**21-Dec-2016**	03-Jan-2017	✓	**21-Dec-2016**	03-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
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
MW02_1.0-1.1, MW01_0.22-0.32, QA04, SB01_4.9-5.0	MW02_6.9-7.0, MW01_5.9-6.0, SB01_0.4-0.5,	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
HDPE Soil Jar (EP231X)								
SS02,	SS03	**20-Dec-2016**	**27-Dec-2016**	18-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
Plastic Bag (EP231X)								
MW02_Concrete,	SB01_Concrete	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
MW02_1.0-1.1, MW01_0.22-0.32, QA04, SB01_4.9-5.0	MW02_6.9-7.0, MW01_5.9-6.0, SB01_0.4-0.5,	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
HDPE Soil Jar (EP231X)								
SS02,	SS03	**20-Dec-2016**	**27-Dec-2016**	18-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
Plastic Bag (EP231X)								
MW02_Concrete,	SB01_Concrete	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
MW02_1.0-1.1, MW01_0.22-0.32, QA04, SB01_4.9-5.0	MW02_6.9-7.0, MW01_5.9-6.0, SB01_0.4-0.5,	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
HDPE Soil Jar (EP231X)								
SS02,	SS03	**20-Dec-2016**	**27-Dec-2016**	18-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
Plastic Bag (EP231X)								
MW02_Concrete,	SB01_Concrete	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
MW02_1.0-1.1, MW01_0.22-0.32, QA04, SB01_4.9-5.0	MW02_6.9-7.0, MW01_5.9-6.0, SB01_0.4-0.5,	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
HDPE Soil Jar (EP231X)								
SS02,	SS03	**20-Dec-2016**	**27-Dec-2016**	18-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
Plastic Bag (EP231X)								
MW02_Concrete,	SB01_Concrete	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-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)							
MW02_1.0-1.1, MW02_6.9-7.0, MW01_0.22-0.32, MW01_5.9-6.0, QA04, SB01_0.4-0.5, SB01_4.9-5.0	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
HDPE Soil Jar (EP231X)							
SS02, SS03	**20-Dec-2016**	**27-Dec-2016**	18-Jun-2017	✓	**27-Dec-2016**	05-Feb-2017	✓
Plastic Bag (EP231X)							
MW02_Concrete, SB01_Concrete	**19-Dec-2016**	**27-Dec-2016**	17-Jun-2017	✓	**27-Dec-2016**	05-Feb-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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**20-Dec-2016**	20-Dec-2016	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**23-Dec-2016**	27-Dec-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**20-Dec-2016**	03-Jan-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	17-Jan-2017	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	17-Jan-2017	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**28-Dec-2016**	17-Jan-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**28-Dec-2016**	18-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
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**28-Dec-2016**	17-Jan-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**22-Dec-2016**	27-Dec-2016	✓	**23-Dec-2016**	31-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**22-Dec-2016**	03-Jan-2017	✓	**22-Dec-2016**	03-Jan-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**22-Dec-2016**	27-Dec-2016	✓	**23-Dec-2016**	31-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**22-Dec-2016**	03-Jan-2017	✓	**22-Dec-2016**	03-Jan-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**22-Dec-2016**	03-Jan-2017	✓	**22-Dec-2016**	03-Jan-2017	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	18-Jun-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	18-Jun-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	18-Jun-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	18-Jun-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
FW01, SW01, SW02, SW03	**20-Dec-2016**	**----**	----	----	**21-Dec-2016**	18-Jun-2017	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Exchangeable Cations	ED007	2	3	**66.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	**16.67**	**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	13	**15.38**	**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)							
Exchangeable Cations	ED007	2	3	**66.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**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)							
Exchangeable Cations	ED007	2	3	**66.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**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	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

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							
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	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	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	17	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	5.88	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)							
Chloride by Discrete Analyser	ED045G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	17	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations on Alkaline Soils	ED006	SOIL	In house: Referenced to Soil Survey Test Method C5. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with alcoholic ammonium chloride at pH 8.5. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
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.
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
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)
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)
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
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons 2011 method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Dry and Crush	EN84	SOIL	In house
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

QUALITY CONTROL REPORT

Work Order	: **ES1629370**	Page	: 1 of 21
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	: 21-25583-06 Greenacre	Date Samples Received	: 20-Dec-2016
Order number	: ----	Date Analysis Commenced	: 20-Dec-2016
C-O-C number	: ----	Issue Date	: 04-Jan-2017
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 40		
No. of samples analysed	: 17		

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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002 : pH (Soils) (QC Lot: 700647)									
ES1629148-011	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.7	7.7	0.00	0% - 20%
EW1604849-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	5.8	5.8	0.00	0% - 20%
EA055: Moisture Content (QC Lot: 701268)									
ES1629356-012	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	24.2	24.0	0.950	0% - 20%
ES1629370-016	SS02	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	1.5	1.8	16.8	No Limit
ED006: Exchangeable Cations on Alkaline Soils (QC Lot: 707562)									
ES1628803-001	Anonymous	ED006: Exchangeable Calcium	----	0.1	meq/100g	1.0	1.1	0.00	No Limit
		ED006: Exchangeable Magnesium	----	0.1	meq/100g	2.1	2.3	7.01	0% - 50%
		ED006: Exchangeable Potassium	----	0.1	meq/100g	3.2	3.5	11.3	0% - 50%
		ED006: Exchangeable Sodium	----	0.1	meq/100g	4.4	4.9	10.9	0% - 20%
		ED006: Cation Exchange Capacity	----	0.1	meq/100g	10.6	11.7	10.0	0% - 20%
ES1629370-004	MW01_5.9-6.0	ED006: Exchangeable Calcium	----	0.1	meq/100g	2.9	3.0	3.88	0% - 50%
		ED006: Exchangeable Magnesium	----	0.1	meq/100g	3.0	2.9	0.00	0% - 50%
		ED006: Exchangeable Potassium	----	0.1	meq/100g	0.3	0.3	0.00	No Limit
		ED006: Exchangeable Sodium	----	0.1	meq/100g	1.9	1.9	0.00	No Limit
		ED006: Cation Exchange Capacity	----	0.1	meq/100g	8.0	8.1	0.00	0% - 20%
ED007: Exchangeable Cations (QC Lot: 707647)									
ES1629298-001	Anonymous	ED007: Exchangeable Calcium	----	0.1	meq/100g	5.4	5.3	0.00	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	3.1	3.0	0.00	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.7	0.7	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.9	0.9	0.00	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	10.0	9.9	1.67	0% - 20%
ED007: Exchangeable Cations (QC Lot: 707649)									
ES1629370-001	MW02_1.0-1.1	ED007: Exchangeable Calcium	----	0.1	meq/100g	1.3	1.3	0.00	0% - 50%

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 (%)*
ED007: Exchangeable Cations (QC Lot: 707649) - continued									
ES1629370-001	MW02_1.0-1.1	ED007: Exchangeable Magnesium	----	0.1	meq/100g	11.7	11.9	1.69	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	4.3	4.4	0.00	0% - 20%
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	17.7	18.0	1.68	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 703679)									
ES1629499-040	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	14	10	27.3	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	8	12.7	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	7	20.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	33	20	50.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	86	62	31.2	0% - 50%
ES1629370-008	WC01	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	15	22	36.4	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	9	14.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	13	17	26.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	13	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	82	82	0.00	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 703680)									
ES1629370-008	WC01	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1629501-007	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP004: Organic Matter (QC Lot: 706467)									
ES1629287-019	Anonymous	EP004: Organic Matter	----	0.5	%	41.5	41.5	0.00	0% - 20%
ES1629672-002	Anonymous	EP004: Organic Matter	----	0.5	%	0.7	0.7	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 700643)									
ES1629370-001	MW02_1.0-1.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		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

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: 700643) - continued									
ES1629370-001	MW02_1.0-1.1	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
ES1629370-017	SS03	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
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 700592)									
ES1629341-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1629370-005	QA04	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 700644)									
ES1629370-001	MW02_1.0-1.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1629370-017	SS03	EP071: C15 - C28 Fraction	----	100	mg/kg	630	580	8.14	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	710	650	9.07	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: 700592)									
ES1629341-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1629370-005	QA04	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 700644)									
ES1629370-001	MW02_1.0-1.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1629370-017	SS03	EP071: >C16 - C34 Fraction	----	100	mg/kg	1180	1080	8.76	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	400	370	7.40	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 700592)									
ES1629341-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1629370-005	QA04	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: 700468)									
ES1629287-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0159	0.0185	14.9	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0028	0.0031	11.8	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0576	0.0593	2.92	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0078	0.0066	16.6	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.356	0.327	8.60	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0049	0.0035	32.8	0% - 50%
ES1629370-002	MW02_6.9-7.0	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	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0021	0.0017	20.5	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0042	0.0036	14.6	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: 700468)									
ES1629287-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0011	0.0011	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0038	0.0038	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0011	0.0008	28.6	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0012	0.0012	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	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: 700468) - continued									
ES1629287-002	Anonymous	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	<0.0006	<0.0006	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
ES1629370-002	MW02_6.9-7.0	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	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	0.0004	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: 700468)									
ES1629287-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0011	0.0009	15.9	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	<0.0006	<0.0006	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0006	<0.0006	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0006	<0.0006	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0006	<0.0006	0.00	No Limit
ES1629370-002	MW02_6.9-7.0	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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 700468) - continued									
ES1629370-002	MW02_6.9-7.0	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: 700468)									
ES1629287-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1629370-002	MW02_6.9-7.0	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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 700299)									
EW1604535-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.13	7.15	0.280	0% - 20%
ES1629262-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.06	7.11	0.706	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 702710)									
ES1629275-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	600	724	18.8	0% - 20%
ES1629287-014	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	93	88	5.54	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 700301)									
EW1604535-005	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	31	32	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	31	32	0.00	0% - 20%
ES1629262-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	451	458	1.66	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	451	458	1.66	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 701680)									
ES1629287-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	14	0.00	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 701680) - continued									
ES1629337-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	<1	101	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 701683)									
ES1629370-013	SW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	68	68	0.00	0% - 20%
ME1601780-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	10	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 701679)									
ES1629287-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	47	48	0.00	0% - 20%
ES1629337-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 701682)									
ES1629370-013	SW01	ED045G: Chloride	16887-00-6	1	mg/L	77	77	0.00	0% - 20%
ME1601780-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	905	896	0.932	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 704524)									
ES1629260-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	19	19	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	237	232	2.25	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2020	2000	0.596	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	0% - 50%
ES1629370-013	SW01	ED093F: Calcium	7440-70-2	1	mg/L	101	100	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	24	24	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	66	65	1.89	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	9	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 704528)									
ES1629370-013	SW01	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	0.003	0.002	37.1	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	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.021	0.022	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 704526)									
ES1629275-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1629283-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 704529)									
ES1629370-015	SW03	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 702956)									
EB1629954-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1629451-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 702956)									
EB1629954-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1629451-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	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: BTEXN (QC Lot: 702956)									
EB1629954-001	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
ES1629451-002	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: 700475)									
EM1615490-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	498	478	3.96	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	33.4	32.4	3.04	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	18.5	21.2	13.6	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	190	209	9.31	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	24.1	26.1	7.97	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.05	0.04	0.00	No Limit
ES1629271-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.55	1.43	8.10	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.03	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.04	0.02	41.4	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.50	0.43	14.5	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.05	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: 700475)									
EM1615490-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	18.3	20.9	13.3	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	35.6	33.5	6.08	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	64.1	68.9	7.22	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	9.57	10.6	10.6	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.25	0.26	0.00	0% - 50%
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.46	0.41	11.4	0% - 20%
		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	8.9	9.2	3.18	0% - 20%
ES1629271-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 700475) - continued									
ES1629271-001	Anonymous	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	0.05	0.04	35.3	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: 700475)									
EM1615490-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.32	0.32	0.00	0% - 50%
		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
ES1629271-001	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 700475)									
EM1615490-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	0.09	0.09	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: 700475) - continued									
EM1615490-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	176	159	10.2	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	9.56	9.68	1.28	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1629271-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<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: 700475)									
EM1615490-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1090	1080	0.701	0% - 20%
ES1629271-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.23	1.99	11.4	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
ED006: Exchangeable Cations on Alkaline Soils (QCLot: 707562)								
ED006: Exchangeable Calcium	----	0.1	meq/100g	<0.1	2.5 meq/100g	92.0	80	110
ED006: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	4.17 meq/100g	93.0	80	110
ED006: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1.28 meq/100g	97.2	80	110
ED006: Exchangeable Sodium	----	0.1	meq/100g	<0.1	2.17 meq/100g	95.6	80	110
ED006: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Cations (QCLot: 707647)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	101	76	122
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	95.2	76	118
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	97.0	80	120
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	91.7	80	120
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Cations (QCLot: 707649)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	91.0	76	122
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	89.2	76	118
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	102	80	120
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	94.2	80	120
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 703679)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	105	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.3	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	96.2	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	106	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	98.3	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	103	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	112	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 703680)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	77.8	70	105
EP004: Organic Matter (QCLot: 706467)								
EP004: Organic Matter	----	0.5	%	<0.5	2.53 %	91.7	82	98
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 700643)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	91.1	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	97.3	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	96.2	73	127

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 700643) - continued								
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	92.6	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	92.7	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	94.6	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	92.9	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	94.2	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	89.7	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	92.2	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	93.0	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	91.9	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	92.0	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	92.0	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	92.0	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	88.8	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 700592)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	101	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 700644)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	93.3	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	104	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	93.5	71	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 700592)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	103	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 700644)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	107	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	99.8	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	95.0	63	131
EP080: BTEXN (QCLot: 700592)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	88.8	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.2	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	102	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	104	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	102	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	92.4	63	119
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 700468)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	64.6	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.5	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	52	126

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 700468) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.9	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 700468)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	61.8	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.6	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.4	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.1	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.0	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.2	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.3	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.1	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.9	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.3	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	73.3	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 700468)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.1	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	66.0	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.5	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.6	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	62.1	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.8	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 700468)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.0	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	81.3	60	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 702710)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	95.2	87	109
				<10	293 mg/L	119	66	126

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
ED037P: Alkalinity by PC Titrator (QCLot: 700301)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.9	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 701680)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	117	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 701683)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	118	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 701679)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	112	81	127
				<1	1000 mg/L	93.9	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 701682)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	115	81	127
				<1	1000 mg/L	99.0	81	127
ED093F: Dissolved Major Cations (QCLot: 704524)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.9	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.6	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 704528)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 704526)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.0	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 704529)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.1	83	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 700777)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	94.2	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	101	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	102	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 702956)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	79.1	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 700777)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	102	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	97.6	81	111

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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 700777) - continued								
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	98.7	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 702956)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	82.5	75	127
EP080: BTEXN (QCLot: 702956)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	78.7	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	79.4	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	78.5	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	77.9	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	83.0	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	92.4	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 700475)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	115	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	90.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	116	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	96.8	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 700475)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	110	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	91.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	107	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 700475)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	106	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	81.3	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	104	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	89.4	70	126

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 700475) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	91.6	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 700475)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	108	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	115	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	101	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	112	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 703679)							
ES1629294-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	103	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	# Not Determined	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	# Not Determined	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	# Not Determined	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	# Not Determined	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	93.1	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	# Not Determined	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 703680)							
ES1629370-008	WC01	EG035T: Mercury	7439-97-6	5 mg/kg	89.3	70	130
EP004: Organic Matter (QCLot: 706467)							
ES1629287-019	Anonymous	EP004: Organic Matter	----	4.58 %	# Not Determined	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 700643)							
ES1629370-001	MW02_1.0-1.1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	87.7	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	92.7	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 700592)							
ES1629341-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	79.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 700644)							
ES1629370-001	MW02_1.0-1.1	EP071: C10 - C14 Fraction	----	523 mg/kg	79.2	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	96.3	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	108	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 700592)							
ES1629341-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	74.4	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 700644)							
ES1629370-001	MW02_1.0-1.1	EP071: >C10 - C16 Fraction	----	860 mg/kg	83.4	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	104	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	95.0	52	132
EP080: BTEXN (QCLot: 700592)							
ES1629341-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	73.4	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	79.4	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	82.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	83.3	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	78.4	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	74.6	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 700468)							
ES1629287-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	81.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	64.8	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	90.4	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	64.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 700468)							
ES1629287-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	74.5	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	76.5	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	111	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	82.0	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	88.3	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	91.3	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	77.8	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	71.7	50	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Matrix Spike (MS) Report: Recovery Limits (%) Low	Matrix Spike (MS) Report: Recovery Limits (%) High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 700468) - continued							
ES1629287-002	Anonymous	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	61.5	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	70.7	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	85.9	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 700468)							
ES1629287-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	76.3	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	73.4	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	120	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	92.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	74.0	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	75.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	53.7	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 700468)							
ES1629287-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	92.2	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	68.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	63.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	57.6	50	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Matrix Spike (MS) Report: Recovery Limits (%) Low	Matrix Spike (MS) Report: Recovery Limits (%) High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 701680)							
ES1629287-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	97.6	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 701683)							
ES1629370-013	SW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 701679)							
ES1629287-007	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 701682)							
ES1629370-013	SW01	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 704528)							
ES1629370-012	FW01	EG020A-F: Arsenic	7440-38-2	1 mg/L	103	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	100	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	71.0	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 704528) - continued							
ES1629370-012	FW01	EG020A-F: Copper	7440-50-8	1 mg/L	96.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	86.1	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	100	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 704526)							
ES1629260-003	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	81.7	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 704529)							
ES1629370-014	SW02	EG035F: Mercury	7439-97-6	0.01 mg/L	77.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 702956)							
EB1629954-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	111	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 702956)							
EB1629954-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	110	70	130
EP080: BTEXN (QCLot: 702956)							
EB1629954-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	95.2	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.7	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	99.7	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	105	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	96.9	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 700475)							
EM1615490-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	# Not Determined	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	94.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 700475)							
EM1615490-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	108	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	# Not Determined	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*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 700475) - continued							
EM1615490-001	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	126	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	106	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	87.0	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	89.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	96.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	119	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 700475)							
EM1615490-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	107	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	113	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	83.3	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	115	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	94.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	118	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	107	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 700475)							
EM1615490-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	90.2	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	# Not Determined	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	# Not Determined	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	96.4	50	130

PTO for second COC.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka 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: 02 4423 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

URGENT HT

CLIENT: GHD Pty Ltd

OFFICE: Sydney

PROJECT: 21-25583-06 Greenacre

ORDER NUMBER: 2125583 06

PROJECT MANAGER: Ben Anderson / Nicole Rosen

CONTACT PH: 02 9239 7170 / 0408 713 343

SAMPLER: ~~Terry Nham~~ Alice Walker

SAMPLER MOBILE: ~~0403 251 883~~ 0415952 75

COC emailed to ALS? (YES / (NO))

EDD FORMAT (or default): esdat

Email Reports to: ben.anderson@ghd.com nicole.rosen@ghd.com ~~terry.nham@ghd.com~~ alice.walker@ghd

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):

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: 2.3 °C
Other comment:

RELINQUISHED BY: ~~Terry Nham (GHD)~~ Alice Walker
DATE/TIME: 12/01/17

RECEIVED BY: J. Crealy
DATE/TIME: 13/01/17 13:30

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: please group into appropriate suites, metals field filtered.

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).

ALS USE: LAB ID	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W): SAMPLE ID	DATE / TIME	MATRIX	CONTAINER INFORMATION: TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS (Full Suite)	TRH/BTEX, ~~PAH, 8 Metals (Suite S-26 / W-26)~~	8 metals ~~TRH, BTEX, PAH (Suite S-7 / W-7)~~ (dissolved)	~~TOC~~ TDS	~~CEC~~	pH	~~TDS~~	Major Anions / Cations	Alkalinity
1	MW01	12/01/16 pm	water		7	X	X	X	X		X		X	X
2	MW02	12/01/16 pm	water		7	X	X	X	X		X		X	X
				TOTAL										

Environmental Division
Sydney
Work Order Reference
ES1700775
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1700775**	Page	: 1 of 7
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	: 21-25583-06 GREENACRE	Date Samples Received	: 13-Jan-2017 13:30
Order number	: 2125583 06	Date Analysis Commenced	: 16-Jan-2017
C-O-C number	: ----	Issue Date	: 23-Jan-2017 12:37
Sampler	: ALICE WALKER		
Site	: ----		
Quote number	: EN/005/15S - SYDNEY ONLY		
No. of samples received	: 3		
No. of samples analysed	: 3		

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
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- EP231: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	TB	----	----
				Client sampling date / time	[12-Jan-2017]	[12-Jan-2017]	13-Jan-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1700775-001	ES1700775-002	ES1700775-003	--------	--------
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.63	7.43	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		3550	12800	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		613	724	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		613	724	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		548	662	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1160	5940	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		112	244	----	----	----
Magnesium	7439-95-4	1	mg/L		95	448	----	----	----
Sodium	7440-23-5	1	mg/L		902	3020	----	----	----
Potassium	7440-09-7	1	mg/L		7	19	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.003	0.009	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		56.4	196	----	----	----
Total Cations	----	0.01	meq/L		52.8	181	----	----	----
Ionic Balance	----	0.01	%		3.26	3.96	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	TB	----	----
				Client sampling date / time	[12-Jan-2017]	[12-Jan-2017]	13-Jan-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1700775-001	ES1700775-002	ES1700775-003	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**9.96**	<0.10	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**9.86**	<0.10	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**145**	<0.10	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**7.05**	<0.10	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**90.8**	<0.05	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.10	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	TB	----	----
				Client sampling date / time	[12-Jan-2017]	[12-Jan-2017]	13-Jan-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1700775-001	ES1700775-002	ES1700775-003	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**1.9**	<0.5	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**3.66**	<0.10	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**16.9**	<0.10	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**2.15**	<0.10	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**5.24**	<0.05	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.10	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.10	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.10	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.10	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.10	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.25	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.10	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.25	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.25	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.25	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.25	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.10	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.10	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.25	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	TB	----	----
				Client sampling date / time	[12-Jan-2017]	[12-Jan-2017]	13-Jan-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1700775-001	ES1700775-002	ES1700775-003	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.12**	<0.25	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.25	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.25	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**293**	<0.10	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**236**	<0.10	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**276**	<0.10	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**115**	**113**	**110**	----	----
Toluene-D8	2037-26-5	2	%		**111**	**109**	**107**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**110**	**106**	**102**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**111**	**113**	----	----	----

Surrogate Control Limits

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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1700775**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: 21-25583-06 GREENACRE	Date Samples Received	: 13-Jan-2017
Site	: ----	Issue Date	: 23-Jan-2017
Sampler	: ALICE WALKER	No. of samples received	: 3
Order number	: 2125583 06	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **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

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED045G: Chloride by Discrete Analyser	ES1700710--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1700754--001	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
MW01, MW02	----	----	----	16-Jan-2017	12-Jan-2017	**4**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Dissolved Mercury by FIMS	2	21	9.52	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**16-Jan-2017**	12-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	**12-Jan-2017**	**----**	----	----	**19-Jan-2017**	19-Jan-2017	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**16-Jan-2017**	26-Jan-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	09-Feb-2017	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	09-Feb-2017	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	09-Feb-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	11-Jul-2017	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	09-Feb-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW01, MW02	**12-Jan-2017**	**17-Jan-2017**	19-Jan-2017	✓	**18-Jan-2017**	26-Feb-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02	**12-Jan-2017**	**16-Jan-2017**	26-Jan-2017	✓	**16-Jan-2017**	26-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TB	**13-Jan-2017**	**16-Jan-2017**	27-Jan-2017	✓	**16-Jan-2017**	27-Jan-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
MW01, MW02	**12-Jan-2017**	**17-Jan-2017**	19-Jan-2017	✓	**18-Jan-2017**	26-Feb-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02	**12-Jan-2017**	**16-Jan-2017**	26-Jan-2017	✓	**16-Jan-2017**	26-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TB	**13-Jan-2017**	**16-Jan-2017**	27-Jan-2017	✓	**16-Jan-2017**	27-Jan-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02	**12-Jan-2017**	**16-Jan-2017**	26-Jan-2017	✓	**16-Jan-2017**	26-Jan-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TB	**13-Jan-2017**	**16-Jan-2017**	27-Jan-2017	✓	**16-Jan-2017**	27-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
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	11-Jul-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	11-Jul-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	11-Jul-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	11-Jul-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
MW01, MW02	**12-Jan-2017**	**----**	----	----	**17-Jan-2017**	11-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)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	21	**9.52**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**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	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
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	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
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	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the 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)

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
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
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

QUALITY CONTROL REPORT

Work Order	: **ES1700775**	Page	: 1 of 10
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	: 21-25583-06 GREENACRE	Date Samples Received	: 13-Jan-2017
Order number	: 2125583 06	Date Analysis Commenced	: 16-Jan-2017
C-O-C number	: ----	Issue Date	: 23-Jan-2017
Sampler	: ALICE WALKER		
Site	: ----		
Quote number	: EN/005/15S - SYDNEY ONLY		
No. of samples received	: 3		
No. of samples analysed	: 3		

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
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 721117)									
ES1700706-017	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	8.25	3.33	0% - 20%
ES1700706-026	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.17	8.42	3.01	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 725303)									
ES1700724-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1360	1440	6.06	0% - 20%
ES1700775-001	MW01	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3550	3530	0.424	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 721119)									
ES1700706-017	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	84	85	1.45	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	84	85	1.45	0% - 20%
ES1700706-026	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	5	135	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	112	0.984	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	111	118	5.47	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 722446)									
ES1700712-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.00	No Limit
ES1700920-001	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: 722445)									
ES1700885-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1580	1570	0.211	0% - 20%
ES1700710-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1750	1720	1.73	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 721995)									
ES1700726-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	17	17	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	21	21	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	44	44	0.00	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 (%)*
ED093F: Dissolved Major Cations (QC Lot: 721995) - continued									
ES1700726-004	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1700747-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	637	644	1.07	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	617	620	0.544	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	426	424	0.385	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 721997)									
ES1700775-001	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	<0.001	<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	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 721992)									
ES1700723-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1700747-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0001	0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 719752)									
ES1700775-001	MW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1700804-021	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 719752)									
ES1700775-001	MW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1700804-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 719752)									
ES1700775-001	MW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1700804-021	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: 720071)									
ES1700754-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	12.0	11.4	5.43	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 720071) - continued									
ES1700754-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.08	0.07	15.6	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.11	0.11	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.32	1.26	5.35	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.12	0.10	13.6	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1700827-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	11.9	12.1	1.59	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	2.14	2.34	9.01	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.67	1.67	0.00	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	4.85	5.40	10.8	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.42	0.50	15.9	0% - 20%
		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: 720071)									
ES1700754-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.16	0.14	8.64	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.14	0.13	8.18	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.64	0.59	7.95	0% - 20%
		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
ES1700827-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.48	0.51	5.24	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.20	0.22	11.6	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.07	1.20	11.0	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.27	0.31	14.1	0% - 50%
		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: 720071)									
ES1700754-001	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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 720071) - continued									
ES1700754-001	Anonymous	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
ES1700827-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 720071)									
ES1700754-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<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
ES1700827-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 720071)									
ES1700754-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	14.6	13.8	5.41	0% - 20%
ES1700827-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	23.0	24.2	5.29	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
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 725303)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	87	109
				<10	293 mg/L	106	66	126
ED037P: Alkalinity by PC Titrator (QCLot: 721119)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	98.1	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 722446)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 722445)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.4	81	127
				<1	1000 mg/L	97.2	81	127
ED093F: Dissolved Major Cations (QCLot: 721995)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	90.2	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	105	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	115	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 721997)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.1	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.4	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.5	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.1	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 721992)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.4	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 721998)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.3	83	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 719752)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	96.8	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 720413)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	97.2	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	96.0	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	100	75	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 719752)								

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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 719752) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	96.8	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 720413)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	96.3	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	97.4	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	96.3	77	119
EP080: BTEXN (QCLot: 719752)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	102	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.5	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	89.9	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	89.8	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	91.8	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	84.0	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 720071)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	79.4	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	88.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	81.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	95.0	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	89.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	89.2	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 720071)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	80.6	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	87.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	77.0	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	88.6	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	86.8	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	91.0	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	84.4	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	95.6	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	85.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	88.2	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	106	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 720071)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	86.6	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	87.4	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	90.8	70	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 720071) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	91.5	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	82.6	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	84.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 720071)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	82.2	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	108	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	100	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	88.2	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 722446)							
ES1700712-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	124	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 722445)							
ES1700710-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 721997)							
ES1700775-002	MW02	EG020A-F: Arsenic	7440-38-2	1 mg/L	108	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	98.3	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	94.6	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	100.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	101	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 721992)							
ES1700723-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	85.9	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 721998)							
ES1700775-002	MW02	EG035F: Mercury	7439-97-6	0.01 mg/L	74.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 719752)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 719752) - continued							
ES1700775-001	MW01	EP080: C6 - C9 Fraction	----	325 µg/L	108	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 719752)							
ES1700775-001	MW01	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	108	70	130
EP080: BTEXN (QCLot: 719752)							
ES1700775-001	MW01	EP080: Benzene	71-43-2	25 µg/L	102	70	130
		EP080: Toluene	108-88-3	25 µg/L	98.7	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	104	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	106	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	91.4	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 720071)							
ES1700754-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	79.8	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	97.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	88.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	108	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	73.6	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 720071)							
ES1700754-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	64.9	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	80.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	79.8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	94.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	97.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	97.8	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	108	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	90.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	70.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	86.2	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	73.3	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 720071)							
ES1700754-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	116	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	77.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	95.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	96.5	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*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 720071) - continued							
ES1700754-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	78.3	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	72.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	69.0	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 720071)							
ES1700754-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	109	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	112	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	121	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	85.2	50	130

Fadi Soro

FAD; 13/1/17 12:50pm

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

And one more, sorry mate, last one for today.

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

Subscribe Training

EnviroMail™ 00 – All EnviroMails in one convenient download.

Right Solutions • Right Partner
www.alsglobal.com

Environmental Division
Sydney
Work Order Reference
ES1700846

Telephone : +61-2-8784 8555

From: Nicole Rosen [mailto:Nicole.Rosen@ghd.com]
Sent: Friday, 13 January 2017 11:54 AM
To: Sepan Mahamad <Sepan.Mahamad@alsglobal.com>
Cc: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Subject: ASLP Greenacre - additional samples

Hi Sepan,
Greenacre **21/25583/06** – From lab report ES1629370

The following samples are required for ALSP – PFAS full suite
ES1629370016 – **SS02** 1
ES1629370017 – **SS03** 2
ES1629370001 – **MW02_1.0-1.1** 3
ES1629370003 – **MW01_0.22-0.32** 4
ES1629370004 – **MW01_5.9-6.0** 5
ES1629370010 – **MW02_concrete** 6
ES1629370006 – **SB01_0.4-0.5** 7

5697-700

5777-779

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

Please consider the environment before printing this email

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1700846**	Page	: 1 of 9
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	: 21-25583-06 Greenacre	Date Samples Received	: 13-Jan-2017 12:50
Order number	: ----	Date Analysis Commenced	: 20-Jan-2017
C-O-C number	: ----	Issue Date	: 27-Jan-2017 10:45
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 7		
No. of samples analysed	: 7		

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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SS02	SS03	MW02_1.0-1.1	MW01_0.22-0.32	MW01_5.9-6.0
				Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1700846-001	ES1700846-002	ES1700846-003	ES1700846-004	ES1700846-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.42**	<0.02	**0.08**	**0.02**	**0.07**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.47**	<0.02	**0.06**	<0.02	**0.04**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**6.30**	**0.27**	**0.75**	**0.26**	**0.44**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**1.54**	**0.05**	**0.15**	<0.02	**0.03**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**71.3**	**4.82**	**3.51**	**0.61**	**0.22**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		**0.09**	<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		**0.47**	**0.04**	**0.03**	**0.10**	**0.04**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.72**	**0.07**	**0.08**	**0.23**	**0.12**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.30**	<0.02	<0.02	**0.02**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.72**	**0.04**	**0.07**	**0.05**	**0.02**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.08**	<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		**0.12**	**0.09**	<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	SS02	SS03	MW02_1.0-1.1	MW01_0.22-0.32	MW01_5.9-6.0
				Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1700846-001	ES1700846-002	ES1700846-003	ES1700846-004	ES1700846-005
					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		**34.6**	**0.52**	<0.05	**0.19**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**5.32**	**0.58**	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		**0.20**	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**125**	**6.48**	**4.73**	**1.48**	**0.98**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**77.6**	**5.09**	**4.26**	**0.87**	**0.66**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**122**	**6.34**	**4.52**	**1.48**	**0.91**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.0**	**101**	**105**	**102**	**100**

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	MW02_concrete	SB01_0.4-0.5	----	----	----
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1700846-006	ES1700846-007	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**1.22**	**0.03**	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.62**	**0.02**	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**4.03**	**0.20**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.27**	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**6.40**	**0.57**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.28**	**0.06**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.22**	**0.09**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.10**	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.33**	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	MW02_concrete	SB01_0.4-0.5	----	----	----
				Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1700846-006	ES1700846-007	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<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	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**1.01**	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**15.5**	**0.97**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**10.4**	**0.77**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**14.6**	**0.95**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.2**	**101**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS02	SS03	MW02_1.0-1.1	MW01_0.22-0.32	MW01_5.9-6.0
			Client sampling date / time	20-Dec-2016 00:00	20-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00	19-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1700846-001	ES1700846-002	ES1700846-003	ES1700846-004	ES1700846-005
				Result	Result	Result	Result	Result
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**7.8**	**8.2**	**5.5**	**8.9**	**8.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MW02_concrete	SB01_0.4-0.5	----	----	----
			Client sampling date / time	19-Dec-2016 00:00	19-Dec-2016 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1700846-006	ES1700846-007	--------	--------	--------
				Result	Result	----	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**11.9**	**7.8**	**----**	**----**	**----**

Surrogate Control Limits

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

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1700846**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: 21-25583-06 Greenacre	Date Samples Received	: 13-Jan-2017
Site	: ----	Issue Date	: 27-Jan-2017
Sampler	: TERRY NHAM	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **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	ES1700845--003	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1700845--003	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN60: Bottle Leaching Procedure							
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) MW01_0.22-0.32	**19-Dec-2016**	**20-Jan-2017**	17-Jun-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) MW02_1.0-1.1, MW01_5.9-6.0, MW02_concrete, SB01_0.4-0.5	**19-Dec-2016**	**23-Jan-2017**	17-Jun-2017	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-Dla) SS02, SS03	**20-Dec-2016**	**20-Jan-2017**	18-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
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) SS02, SS03, MW01_0.22-0.32	**20-Jan-2017**	**----**	----	----	**23-Jan-2017**	19-Jul-2017	✓
HDPE (no PTFE) (EP231X) MW02_1.0-1.1, MW01_5.9-6.0, MW02_concrete, SB01_0.4-0.5	**23-Jan-2017**	**----**	----	----	**24-Jan-2017**	22-Jul-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SS02, SS03, MW01_0.22-0.32	**20-Jan-2017**	**----**	----	----	**23-Jan-2017**	19-Jul-2017	✓
HDPE (no PTFE) (EP231X) MW02_1.0-1.1, MW01_5.9-6.0, MW02_concrete, SB01_0.4-0.5	**23-Jan-2017**	**----**	----	----	**24-Jan-2017**	22-Jul-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SS02, SS03, MW01_0.22-0.32	**20-Jan-2017**	**----**	----	----	**23-Jan-2017**	19-Jul-2017	✓
HDPE (no PTFE) (EP231X) MW02_1.0-1.1, MW01_5.9-6.0, MW02_concrete, SB01_0.4-0.5	**23-Jan-2017**	**----**	----	----	**24-Jan-2017**	22-Jul-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SS02, SS03, MW01_0.22-0.32	**20-Jan-2017**	**----**	----	----	**23-Jan-2017**	19-Jul-2017	✓
HDPE (no PTFE) (EP231X) MW02_1.0-1.1, MW01_5.9-6.0, MW02_concrete, SB01_0.4-0.5	**23-Jan-2017**	**----**	----	----	**24-Jan-2017**	22-Jul-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SS02, SS03, MW01_0.22-0.32	**20-Jan-2017**	**----**	----	----	**23-Jan-2017**	19-Jul-2017	✓
HDPE (no PTFE) (EP231X) MW02_1.0-1.1, MW01_5.9-6.0, MW02_concrete, SB01_0.4-0.5	**23-Jan-2017**	**----**	----	----	**24-Jan-2017**	22-Jul-2017	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**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-Dla	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1700846**	Page	: 1 of 11
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	: 21-25583-06 Greenacre	Date Samples Received	: 13-Jan-2017
Order number	: ----	Date Analysis Commenced	: 20-Jan-2017
C-O-C number	: ----	Issue Date	: 27-Jan-2017
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 7		
No. of samples analysed	: 7		

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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 728892)									
ES1700845-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.43	0.46	6.35	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.06	0.05	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1700845-014	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.17	0.18	0.00	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 731237)									
ES1700845-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	67.4	67.7	0.324	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.75	0.77	2.89	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.86	0.85	0.00	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	9.52	9.88	3.70	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.47	1.40	4.45	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1701175-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	671	699	4.12	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	11.3	11.4	1.32	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	9.11	9.21	1.09	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	84.7	83.0	2.09	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	15.8	16.2	2.19	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.20	<0.20	0.00	No Limit

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: 728892)									
ES1700845-004	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
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1700845-014	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
		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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 731237)									
ES1700845-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.39	1.33	4.05	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.36	0.38	6.49	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.92	2.00	4.14	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.42	0.44	2.78	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (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
ES1701175-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	9.88	9.54	3.50	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	5.21	5.59	7.04	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	18.2	18.2	0.110	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	2.31	1.75	27.6	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.20	<0.20	0.00	No Limit

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: 731237) - continued									
ES1701175-006	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.4	5.3	19.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 728892)									
ES1700845-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1700845-014	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 731237)									
ES1700845-003	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

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: 731237) - continued									
ES1700845-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1701175-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	2.01	2.10	4.38	0% - 50%
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.50	<0.50	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 728892)									
ES1700845-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1700845-014	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 731237)									
ES1700845-003	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

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: 731237) - continued									
ES1700845-003	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1701175-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	0.54	0.53	1.87	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	45.9	44.7	2.76	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	8.63	8.27	4.26	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.50	<0.50	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 728892)									
ES1700845-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.49	0.51	4.00	0% - 20%
ES1700845-014	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.17	0.18	5.71	No Limit
EP231P: PFAS Sums (QC Lot: 731237)									
ES1700845-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	84.1	84.8	0.782	0% - 20%
ES1701175-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	889	915	2.86	0% - 20%

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

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

Sub-Matrix: **WATER**

				Method 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: 728892)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	122	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	91.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 731237)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	83.6	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	79.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	92.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	78.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	98.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728892)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	98.8	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	88.6	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	111	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.6	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	86.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	113	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 731237)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	82.6	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	89.4	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	101	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	87.8	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	102	70	130

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
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 731237) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	92.2	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	89.6	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	92.3	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728892)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	86.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	116	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	109	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	94.2	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	93.5	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	86.0	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 731237)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	97.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	109	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	110	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 728892)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	98.2	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	91.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	111	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	81.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 731237)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	81.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	111	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	104	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	86.2	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				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: 728892)							
ES1700845-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	106	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	106	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	114	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	108	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	109	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	108	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 731237)							
ES1700845-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	80.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	77.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	99.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	119	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728892)							
ES1700845-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	106	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	113	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	109	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	120	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	109	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	118	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	104	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	121	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	120	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	85.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	80.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 731237)							
ES1700845-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	111	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	86.4	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	93.2	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	95.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	88.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	108	50	130

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
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 731237) - continued							
ES1700845-003	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	111	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	115	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	97.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	104	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	98.5	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728892)							
ES1700845-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	86.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	110	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	111	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	76.1	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	93.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	83.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	105	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 731237)							
ES1700845-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	116	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	107	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	107	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	106	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	108	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	112	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	106	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 728892)							
ES1700845-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	111	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	77.4	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	82.0	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 731237)							
ES1700845-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	99.4	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*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 731237) - continued							
ES1700845-003	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	95.0	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	116	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	85.2	50	130

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 :	**Project Manager :** Ben Anderson / Nicole Rosen	**PROJECT Number :** 21-25583-06	**Eurofins | mgt quote ID :** GHD Rates 2016
Level 15, 133 Castlereagh Street, Sydney NSW 2000	**Email for results :** terry.nham@ghd.com ben.anderson@ghd.com nicole.rosen@ghd.com	**PROJECT Name :** Greenacre	**Data output format:** ESDAT

Special Directions & Comments :

Eurofins | mgt DI water batch number:

Analytes

	Sample ID	Date	Matrix	PFOS/PFOA Suite	TRH, BTEX, PAH, 8M (Suite B7)	TRH, BTEX, PAH (Suite B4)	TRH / BTEX Suite 8 Metals	8 Metals
1	QA02	19/12/16	Soil	X		X		
2	BA101	20/12/16	Water	X			X	X
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 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

Containers:

	500LP	250P	500P	250DA	40mL vial	125mL A	Jar	Bag	Sample comments:
1							2		
2	2		2	1	2				
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

Relinquished By: Terry Nham - GHD
Date & Time : 20/12/2016
Signature:

Laboratory Staff
Received By: Helen-ALS
Date & Time : 20-12-16 12:10pm
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: 9.3°

Report number: 528424

Alena - Eurofins mgt
21/12 1:17pm

eurofins | mgt

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 18217

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**GHD Pty Ltd NSW**
Contact name:	Ben Anderson
Project name:	GREENACRE
Project ID:	21-25583-06
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Dec 21, 2016 1:12 PM
Eurofins | mgt reference:	**528924**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 8.3 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Ben Anderson - ben.anderson@ghd.com.

eurofins | mgt

Certificate of Analysis

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ben Anderson**

Report **528924-S**
Project name GREENACRE
Project ID 21-25583-06
Received Date Dec 21, 2016

Client Sample ID			**QA02**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**S16-De22633**
Date Sampled			**Dec 19, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-36 (Total)	50	mg/kg	< 50
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	78
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5

Client Sample ID			QA02
Sample Matrix			Soil
Eurofins | mgt Sample No.			S16-De22633
Date Sampled			Dec 19, 2016
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	97
p-Terphenyl-d14 (surr.)	1	%	82
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluorobutanesulfonic acid (PFBS)	0.005	mg/kg	< 0.005
Perfluorobutanoic acid (PFBA)	0.005	mg/kg	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	mg/kg	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.005	mg/kg	< 0.005
Perfluoropentanoic acid (PFPeA)	0.005	mg/kg	< 0.005
Perfluorohexanoic acid (PFHxA)	0.005	mg/kg	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	mg/kg	< 0.005
Perfluorooctanoic acid (PFOA)	0.005	mg/kg	< 0.005
Perfluorononanoic acid (PFNA)	0.005	mg/kg	< 0.005
Perfluorodecanoic acid (PFDA)	0.005	mg/kg	< 0.005
Perfluoroundecanoic acid (PFUnA)	0.005	mg/kg	< 0.005
Perfluorododecanoic acid (PFDoA)	0.005	mg/kg	< 0.005
Perfluorotridecanoic acid (PFTrDA)	0.005	mg/kg	< 0.005
Perfluorotetradecanoic acid (PFTeDA)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonamide (PFOSA)	0.01	mg/kg	< 0.01
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.01	mg/kg	< 0.01
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.005	mg/kg	< 0.005
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.005	mg/kg	< 0.005
d5-n-EtFOSAA (surr.)	1	%	128
13C-PFHxA (surr.)	1	%	112
13C8-PFOS (surr.)	1	%	110
% Moisture	1	%	9.0

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
Eurofins | mgt Suite B4			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Dec 22, 2016	14 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
BTEX	Melbourne	Dec 22, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 22, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Melbourne	Dec 22, 2016	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 22, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Dec 22, 2016	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
% Moisture	Melbourne	Dec 21, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
2-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 18217

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

Project Name: GREENACRE
Project ID: 21-25583-06

Order No.:
Report #: 528924
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Dec 21, 2016 1:12 PM
Due: Dec 30, 2016
Priority: 5 Day
Contact Name: Ben Anderson

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Metals M8 filtered	BTEX	Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set	Total Recoverable Hydrocarbons	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X		X	X	X
Sydney Laboratory - NATA Site # 18217										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	QA02	Dec 19, 2016		Soil	S16-De22633			X	X		X
2	QA101	Dec 19, 2016		Water	S16-De22634	X	X	X		X	
Test Counts						1	1	2	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

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

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							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	mg/kg	< 0.005			0.005	Pass	
Perfluorobutanoic acid (PFBA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/kg	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanoic acid (PFHxA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.005			0.005	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorononanoic acid (PFNA)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanoic acid (PFDA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/kg	< 0.005			0.005	Pass	
Perfluorododecanoic acid (PFDoA)	mg/kg	< 0.005			0.005	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	< 0.005			0.005	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/kg	< 0.01			0.01	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/kg	< 0.01			0.01	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/kg	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/kg	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/kg	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/kg	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	128			70-130	Pass	
TRH C10-C14	%	90			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	109			70-130	Pass	
Toluene	%	102			70-130	Pass	
Ethylbenzene	%	103			70-130	Pass	
m&p-Xylenes	%	103			70-130	Pass	
Xylenes - Total	%	102			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	124			70-130	Pass	
TRH C6-C10	%	112			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	99			70-130	Pass	
Acenaphthylene	%	98			70-130	Pass	
Anthracene	%	95			70-130	Pass	
Benz(a)anthracene	%	95			70-130	Pass	
Benzo(a)pyrene	%	101			70-130	Pass	
Benzo(b&j)fluoranthene	%	83			70-130	Pass	
Benzo(g.h.i)perylene	%	92			70-130	Pass	
Benzo(k)fluoranthene	%	130			70-130	Pass	
Chrysene	%	102			70-130	Pass	
Dibenz(a.h)anthracene	%	100			70-130	Pass	
Fluoranthene	%	100			70-130	Pass	
Fluorene	%	96			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	95			70-130	Pass	
Naphthalene	%	99			70-130	Pass	
Phenanthrene	%	94			70-130	Pass	
Pyrene	%	100			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	94			70-130	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	82			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	76			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	81			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	79			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorodecanesulfonic acid (PFDS)	%	83			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	76			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	74			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	81			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	71			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	84			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	77			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	89			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	75			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	80			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	79			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	67			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	112			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	86			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	78			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	89			50-150	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-De22596	NCP	%	100			70-130	Pass	
TRH C10-C14	M16-De21986	NCP	%	77			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S16-De22596	NCP	%	83			70-130	Pass	
Toluene	S16-De22596	NCP	%	84			70-130	Pass	
Ethylbenzene	S16-De22596	NCP	%	85			70-130	Pass	
m&p-Xylenes	S16-De22596	NCP	%	88			70-130	Pass	
o-Xylene	S16-De22596	NCP	%	89			70-130	Pass	
Xylenes - Total	S16-De22596	NCP	%	88			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S16-De22596	NCP	%	101			70-130	Pass	
TRH C6-C10	S16-De22596	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S16-De21033	NCP	%	103			70-130	Pass	
Acenaphthylene	S16-De21033	NCP	%	103			70-130	Pass	
Anthracene	S16-De21033	NCP	%	90			70-130	Pass	
Benz(a)anthracene	S16-De21033	NCP	%	84			70-130	Pass	
Benzo(a)pyrene	S16-De21033	NCP	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	S16-De21033	NCP	%	90			70-130	Pass	
Benzo(g.h.i)perylene	S16-De21033	NCP	%	80			70-130	Pass	
Benzo(k)fluoranthene	S16-De21033	NCP	%	79			70-130	Pass	
Chrysene	S16-De21033	NCP	%	84			70-130	Pass	
Dibenz(a.h)anthracene	S16-De21033	NCP	%	118			70-130	Pass	
Fluoranthene	S16-De21033	NCP	%	int			70-130	Fail	Q08
Fluorene	S16-De21033	NCP	%	98			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S16-De21033	NCP	%	90			70-130	Pass	
Naphthalene	S16-De21033	NCP	%	103			70-130	Pass	
Phenanthrene	S16-De21033	NCP	%	int			70-130	Fail	Q08
Pyrene	S16-De21033	NCP	%	int			70-130	Fail	Q08
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH >C10-C16	M16-De21986	NCP	%	78			70-130	Pass	
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S16-De22592	NCP	%	76			50-150	Pass	
Perfluorobutanoic acid (PFBA)	S16-De22592	NCP	%	74			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-De22592	NCP	%	80			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-De22592	NCP	%	77			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-De22592	NCP	%	85			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S16-De22592	NCP	%	75			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S16-De22592	NCP	%	72			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-De22592	NCP	%	80			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S16-De22592	NCP	%	74			50-150	Pass	
Perfluorononanoic acid (PFNA)	S16-De22592	NCP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S16-De22592	NCP	%	76			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-De22592	NCP	%	91			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	S16-De22592	NCP	%	84			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S16-De22592	NCP	%	94			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S16-De22592	NCP	%	97			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	S16-De22592	NCP	%	69			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-De22592	NCP	%	105			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-De22592	NCP	%	118			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-De22592	NCP	%	83			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De22592	NCP	%	79			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-De22592	NCP	%	93			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-De22622	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S16-De23435	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S16-De23435	NCP	mg/kg	150	160	4.0	30%	Pass	
TRH C29-C36	S16-De23435	NCP	mg/kg	180	190	4.0	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S16-De22622	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S16-De22622	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S16-De22622	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S16-De22622	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S16-De22622	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S16-De22622	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-De22622	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S16-De22622	NCP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S16-De22633	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S16-De23435	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S16-De23435	NCP	mg/kg	280	290	3.0	30%	Pass	
TRH >C34-C40	S16-De23435	NCP	mg/kg	200	200	2.0	30%	Pass	
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorobutanoic acid (PFBA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M16-De22231	NCP	mg/kg	0.006	0.006	2.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanesulfonamide (PFOSA)	M16-De22231	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	M16-De22231	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	M16-De22231	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M16-De22231	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M16-De22231	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-De22610	NCP	%	14	15	8.0	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
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Nibha Vaidya	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Alex Petridis	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)
Joseph Edouard	Senior Analyst-Organic (VIC)

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

Certificate of Analysis

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ben Anderson**

Report **528924-W**
Project name GREENACRE
Project ID 21-25583-06
Received Date Dec 21, 2016

Client Sample ID			**QA101**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-De22634**
Date Sampled			**Dec 19, 2016**
Test/Reference	LOR	Unit	
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	%	116
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
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	< 0.00001
Perfluorobutanoic acid (PFBA)	0.00005	mg/L	< 0.00005
Perfluorohexanesulfonic acid (PFHxS)	0.00001	mg/L	[N09]0.00002
Perfluorooctanesulfonic acid (PFOS)	0.00001	mg/L	[N09]0.00015
Perfluorodecanesulfonic acid (PFDS)	0.00001	mg/L	< 0.00001
Perfluoropentanoic acid (PFPeA)	0.00001	mg/L	0.00003
Perfluorohexanoic acid (PFHxA)	0.00001	mg/L	0.00003
Perfluoroheptanoic acid (PFHpA)	0.00001	mg/L	< 0.00001
Perfluorooctanoic acid (PFOA)	0.00001	mg/L	[N09]0.00001
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

Client Sample ID			QA101
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-De22634**
Date Sampled			**Dec 19, 2016**
Test/Reference	LOR	Unit	
Per- and Polyfluorinated Alkyl Substances (PFASs)			
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	0.00011
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.00001	mg/L	0.00001
d5-n-EtFOSAA (surr.)	1	%	39
13C-PFHxA (surr.)	1	%	67
13C8-PFOS (surr.)	1	%	57
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	0.020
Lead (filtered)	0.001	mg/L	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Zinc (filtered)	0.005	mg/L	0.081

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
Eurofins | mgt Suite B4			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Dec 29, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
BTEX	Melbourne	Dec 22, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 22, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 29, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Dec 22, 2016	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Metals M8 filtered	Melbourne	Dec 30, 2016	28 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
2-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 18217

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

Project Name: GREENACRE
Project ID: 21-25583-06

Order No.:
Report #: 528924
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Dec 21, 2016 1:12 PM
Due: Dec 30, 2016
Priority: 5 Day
Contact Name: Ben Anderson

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Metals M8 filtered	BTEX	Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set	Total Recoverable Hydrocarbons	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X		X	X	X
Sydney Laboratory - NATA Site # 18217										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	QA02	Dec 19, 2016		Soil	S16-De22633			X	X		X
2	QA101	Dec 19, 2016		Water	S16-De22634	X	X	X		X	
Test Counts						1	1	2	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

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

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							
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	
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	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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	%	93			70-130	Pass	
TRH C10-C14	%	92			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	116			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	86			70-130	Pass	
m&p-Xylenes	%	91			70-130	Pass	
Xylenes - Total	%	93			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	84			70-130	Pass	
TRH C6-C10	%	85			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	86			70-130	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	88			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	141			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	82			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	145			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	56			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	78			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	134			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	139			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	98			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	78			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	77			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	68			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	69			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	74			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	68			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	63			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	61			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	50			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	145			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	61			50-150	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	93			80-120	Pass	
Cadmium (filtered)	%	93			80-120	Pass	
Chromium (filtered)	%	94			80-120	Pass	
Copper (filtered)	%	92			80-120	Pass	
Lead (filtered)	%	92			80-120	Pass	
Mercury (filtered)	%	88			70-130	Pass	
Nickel (filtered)	%	93			80-120	Pass	
Zinc (filtered)	%	96			80-120	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	M16-De23048	NCP	%	95			70-130	Pass	
TRH C10-C14	S16-De22641	NCP	%	85			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M16-De23048	NCP	%	118			70-130	Pass	
Toluene	M16-De23048	NCP	%	100			70-130	Pass	
Ethylbenzene	M16-De23048	NCP	%	96			70-130	Pass	
m&p-Xylenes	M16-De23048	NCP	%	102			70-130	Pass	
o-Xylene	M16-De23048	NCP	%	100			70-130	Pass	
Xylenes - Total	M16-De23048	NCP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M16-De23048	NCP	%	91			70-130	Pass	
TRH C6-C10	M16-De23048	NCP	%	86			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S16-De22641	NCP	%	86			70-130	Pass	
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S16-De22408	NCP	%	92			50-150	Pass	
Perfluorobutanoic acid (PFBA)	S16-De22408	NCP	%	123			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-De22408	NCP	%	93			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-De22408	NCP	%	71			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-De22408	NCP	%	52			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S16-De22408	NCP	%	81			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S16-De22408	NCP	%	110			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-De22408	NCP	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S16-De22408	NCP	%	121			50-150	Pass	
Perfluorononanoic acid (PFNA)	S16-De22408	NCP	%	102			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S16-De22408	NCP	%	72			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-De22408	NCP	%	75			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	S16-De22408	NCP	%	60			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S16-De22408	NCP	%	56			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S16-De22408	NCP	%	50			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	S16-De22408	NCP	%	55			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-De22408	NCP	%	53			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-De22408	NCP	%	54			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-De22408	NCP	%	62			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De22408	NCP	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-De22408	NCP	%	67			50-150	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic (filtered)	M16-De23817	NCP	%	101			70-130	Pass	
Cadmium (filtered)	M16-De23817	NCP	%	98			70-130	Pass	
Chromium (filtered)	M16-De23817	NCP	%	90			70-130	Pass	
Copper (filtered)	M16-De23817	NCP	%	96			70-130	Pass	
Lead (filtered)	M16-De23817	NCP	%	92			70-130	Pass	
Mercury (filtered)	M16-De23817	NCP	%	89			70-130	Pass	
Nickel (filtered)	M16-De23817	NCP	%	98			70-130	Pass	
Zinc (filtered)	M16-De23817	NCP	%	99			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	M16-De23047	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	S16-De22634	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	S16-De22634	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	S16-De22634	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M16-De23047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M16-De23047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M16-De23047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M16-De23047	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M16-De23047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	M16-De23047	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M16-De23047	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M16-De23047	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S16-De22634	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	S16-De22634	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	S16-De22634	CP	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-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorobutanoic acid (PFBA)	S16-De22634	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-De22634	CP	mg/L	0.00002	0.00002	14	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-De22634	CP	mg/L	0.00015	0.00016	4.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S16-De22634	CP	mg/L	0.00003	0.00003	10	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S16-De22634	CP	mg/L	0.00003	0.00003	10	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S16-De22634	CP	mg/L	0.00001	0.00001	6.0	30%	Pass	
Perfluorononanoic acid (PFNA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	

Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorooctanesulfonamide (PFOSA)	S16-De22634	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-De22634	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-De22634	CP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-De22634	CP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De22634	CP	mg/L	0.00011	0.00012	9.0	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-De22634	CP	mg/L	0.00001	0.00001	10	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M16-De23817	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	M16-De23817	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M16-De23817	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M16-De23817	NCP	mg/L	0.026	0.024	6.0	30%	Pass	
Lead (filtered)	M16-De23817	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury (filtered)	M16-De23817	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M16-De23817	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	M16-De23817	NCP	mg/L	0.045	0.043	5.0	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.
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-Metal (VIC)
Alex Petridis	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)
Joseph Edouard	Senior Analyst-Organic (VIC)

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 H – 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

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

Data quality indicator	Frequency	Data quality acceptance criteria
Samples extracted and analysed within holding times		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 E
- Field instrument field checks were undertaken on the equipment:
  - Interface probe: A daily equipment check was undertaken to ensure that the equipment worked correctly when immersed in water.
  - Low flow pump: The low flow sampling equipment was 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 and sediment	1	8	10
Inter	1/10 samples		1		
Intra	1/10 samples	Water	2	6	9
Inter	1/10 samples		1		

All quality control sampling frequency criteria were met during this investigation. The QC sample pairs are:

- QA02 / MW02_6.9-7.0 (Inter-laboratory duplicate)
- QA04 / MW01_5.9-6.0 (Intra-laboratory duplicate)
- QA101 / FW01 (Inter-laboratory duplicate)
- MW01 two repeat tests (considered as two intra-laboratory duplicates)

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.

RPD exceedances were reported during this investigation are:

- Perfluoroheptanoic acid in MW01_5.9-6.0 / QA04 – 40%
- Perfluorooctanoic acid (PFOA) in FW01 / QA101 – 143%
- 6:2 Fluorotelomer Sulfonate (6:2 FTS) in FW01 / QA101 -48%
- Perfluoropentanoic acid in FW01 / QA101 – 50%

Trip blank

A trip blank was sent with the samples to the laboratory, and was analysed for TRH/BTEX. Results were lower than the LOR for all analytes, indicating that no contamination of the samples occurred in transport to the laboratory.

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 6.

Table 6 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

The majority of laboratory RPDs, matrix spike, LCSs and method blanks were within the ALS acceptable ranges. Outliers are shown below:

Laboratory report	Quality Control Sample	Analytes	results	Comment
528924-S	Matrix Spike	Dibenz(a.h)anthracene, phenanthrene, pyrene	118%.	An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Laboratory report	Quality Control Sample	Analytes	results	Comment
ES1629370	Matrix Spike (three soil samples)	Cadmium, chromium, copper, lead, zinc, organic matter, PFHxS, PFOS	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Matrix Spike (two water samples)	Sulfate, perfluorobutane sulfonic acid, perfluoropentane sulfonic acid, perfluorohexane sulfonic acid, perfluoroheptane sulfonic acid, PFOS, perfluoropentanoic acid, perfluorohexanoic acid, perflurorheptanois acid, PFOA, 6:2 fluorotelomer sulfonic acid, 8:2 fluorotelomer sulfonic acid	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
ES1700775	Matrix Spike (two water samples)	Chloride, PFOS	not determined	MS recovery not determined, background level greater than or equal to 4x spike level
	Matrix Spike (one water sample)	PFHxS, PFOS	not determined	MS recovery not determined, background level greater than or equal to 4x spike level

Sample holding times

All samples were extracted and analysed by the laboratory within holding times, except pH at both MW01 and MW02.

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) for the majority of analytes. 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.

GHD

133 Castlereagh St Sydney NSW 2000

-

T: +61 2 9239 7100 F: +61 2 9239 7199 E: sydmail@ghd.com.au

G:\21\25583\WP\219145.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A. Walker	J. Hallchurch		J. Hallchurch		28/02/2017
1	N. Rosen	J. HallChurch		J. Hallchurch		06/03/2017
2	N. Rosen	J. HallChurch		J. Hallchurch		27/04/2017

www.ghd.com