Fire & Rescue NSW

Albion Park Training Facility

Phase 2 Environmental Site Assessment - PFAS

October 2017

Executive summary

Fire and Rescue NSW (FRNSW) engaged GHD Pty Ltd (GHD) to undertake a phase 2 environmental site assessment (ESA) (the Project) for a land parcel identified within Lot 10 DP 1157377 located at Airport Road, Albion Park Rail NSW 2527. The site locations is shown on Figure 1, Appendix A.

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

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

The overall objective of the intrusive investigation is to delineate the PFAS impacts identified during the 2016 ESA works (GHD, 2017), and to assess whether human and ecological receptors on the site and in the surrounding area may be at risk from site impact.

To address the investigation objectives outlined above, and based on the data gaps identified in the conceptual site model (CSM, Table 8.1 in GHD, 2017), this stage of investigation was designed to target:

- PFAS impact in groundwater down gradient of GW03 to assess potential off site migration and risk to possible receptors.
- PFAS impact in surface water and sediments along drainage lines on and off site and Albion Creek to assess risks to down gradient Koona Bay, Lake Illawarra.

The scope of work comprised:

- Review of the EPA comments of the 2016 ESA report (GHD 2017)
- Update of the 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 three off-site locations (GW06 to GW08)
- A groundwater monitoring event (GME) of five previous and three newly installed groundwater wells
- Collection of nine surface water samples (SW01 to SW09) and nine sediment samples (SS01 to SS09)
- Laboratory analysis of selected soil, sediment, surface water and groundwater samples for chemicals of potential concern (COPC)
- Laboratory analysis of a selection of soil and sediment samples for Australian standard leaching procedure (ASLP)
- A quality control and quality assurance (QA/QC) program

- Surveying of newly installed wells.
- Removal of waste soil and groundwater drums including wastes generated during the previous 2016 ESA which remained stored on site in drums
- Preparation of this Phase 2 environmental site assessment report (this report).

The following conclusions were made:

- Analysis of the soil and sediment samples on-site indicated the following:
  - No soil samples concentrations of PFAS were above the nominated human health screening criteria.
  - No soil samples concentrations of PFAS were above the nominated ecological screening criteria.
  - Sediment sample SS05 has the highest PFAS concentrations in sediment across the site.

  Leachability testing confirmed that PFAS impacted soils and sediments have the potential to release PFAS to the environment at concentrations exceeding the nominated screening levels.
- Analysis of the soil and sediment samples off-site indicated the following:
  - Four soil samples had concentrations of PFHxS and PFOS (sum of total) above the nominated human health screening criteria at GW03, SB12, SB14 and SB15 collected during the December 2016 ESA. The screening criteria is highly conservative for residential when the area is open space.
  - Two samples report concentrations of PFOS above the nominated ecological screening at GW03 and SB15 collected during the December 2016 ESA.
  - All off-site sediment samples reported detects of PFAS with the exception of SS02 and SS06. This indicates that PFAS is likely to be migrating off-site via the surface water drainage pathways.
- Analysis of the groundwater and surface water samples collected during the GME indicated the following:
  - The highest concentration of PFAS contamination in groundwater was GW03 located adjacent to the retention pond.
  - GW01 to GW05 exceed drinking water criteria with GW01, GW02 and GW03 exceeding the recreation criteria.
  - GW01, GW02. GW03 and GW04 exceeded the ecological screening criteria.
  - PFAS was detected in surface water in all the surface water drainage lines leading from the retention pond.
  - Levels of PFAS in surface water decrease with increasing distance from site.
  - Concentrations of PFAS in a surface water sample near the discharge point of Albion Creek to Lake Illawarra exceeded ecological guidelines in December 2016. However, was below the limit of detection in May 2017. SW08 and SW09 surface water samples collected in Koona Bay, Lake Illawarra were below the nominated ecological guidelines.
- A conceptual site model has been developed for the site and it is considered that complete or potentially complete exposure pathways between PFAS contamination and identified receptors are present.

Based on these conclusions, and in conjunction with the limitations set out in Section 10 and the assumptions contained throughout the report, the following recommendations are made:

- Gather further information from the residential survey of water use that have been received to characterise groundwater and surface water use down gradient of the FRNSW site.
- Consideration of immediate management actions that can be implemented to address the mass of PFAS present on site and minimise further migration. These management actions may include, but not be limited to:
  - Assess and implement measures to stop the retention pond on the FRNSW site overflowing, and restrict access/use of the water currently in this dam.
  - Sediment trap on the centralised pit to stop the transport of sediment leaving the site.
  - Removal of impacted water and sediment from the pond.
- Validation sampling should be undertaken following the implementation of any management actions. Sampling should be undertaken to accommodate seasonal fluctuation and, for example, following rainfall events to enable assessment of the areas where surface water collects from the ponds.
- Additional investigation to assess whether impacted groundwater is migrating onto the site from the airfield near GW02 and GW01. Data collected during the additional stage of investigations should include re-sampling of all surface and groundwater bore locations to sample during different seasonality. All wells to be sampled for PFAS and major cations and anions.
- The TDS levels in the groundwater have varied between the two sampling rounds and in some monitoring wells this was very significant. During the first round, the groundwater was indicative of seawater and the surface water results showed a mixing of fresh and seawater. An understanding of potential reason for this significant change over sampling events is required to understand whether the wells are being affected by tidal variation or rainfall. This could include installation of groundwater data loggers for a period of at least two months to capture rainfall events.
- Staged approach to biota sampling in Lake Illawarra to provide understanding of PFAS impacts in the wider environment and assist in the site specific risk assessment process.

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Appendices

1. Introduction

Fire and Rescue NSW (FRNSW) engaged GHD Pty Ltd (GHD) to undertake a phase 2 environmental site assessment (ESA) (the Project) for a land parcel identified within Lot 10 DP 1157377 located at Airport Road, Albion Park Rail NSW 2527. The site locations is shown on Figure 1, Appendix A.

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

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

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

Following the PSI, an environmental site assessment (ESA) was undertaken by GHD in 2016. The aim of the investigation was to characterised impacts from PFAS on the site and the surrounding environment. The findings of the ESA are reported in:

- GHD (2017) Fire & Rescue NSW, *Albion Park Training Facility, Environmental Site Assessment*. April 2017 (the 2016 ESA).

The NSW Environment Protection Authority (EPA) reviewed the ESA report (GHD 2017) and made the following recommendations in a letter *Fire & Rescue NSW Firefighting training Sites – Albion Park, Armidale, Deniliquin and Greenacre* (NSW EPA 2017):

- Aquatic biota study in Lake Illawarra to assess the impact of PFAS in the area and potential human health exposure pathways.
- Further information should be collected from the surrounding farmland to assess whether these properties could be affected by potential contaminated groundwater or surface water
- The EPA supports the other recommendations listed in the *Fire & Rescue NSW, Albion Park Training Facility Environmental Site Assessment – PFAS*, GHD April 2017.

This report documents the outcomes of further intrusive site investigations undertaken as part of the second phase of works on the site. For full details on the site history, reference is made to GHD 2016. For completeness, all historical analytical data from the 2016 ESA are tabulated in Appendix B.

1.1 Site background

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

GHD understands the use of AFFF and other firefighting foams potentially containing PFASs were used at a number of FRNSW locations in NSW for firefighting training purposes. For this

reason, PFAS may have been released to the environment, which may have resulted in contamination.

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

1.2 Objective

The overall objective of the intrusive investigation is to delineate the PFAS impacts identified during the 2016 ESA works (GHD, 2017), and to assess whether human and ecological receptors on the site and in the surrounding area may be at risk from site impact.

To address the investigation objectives outlined above, and based on the data gaps identified in the conceptual site model (CSM, Table 8.1 in GHD, 2017), this stage of investigation was designed to target:

- PFAS impact in groundwater down gradient of GW03 to assess potential off site migration and risk to possible receptors.
- PFAS impact in surface water and sediments along drainage lines on and off site and Albion Creek to assess risks to down gradient Koona Bay, Lake Illawarra.

1.3 Scope

The scope of work comprised:

- Review of the EPA comments of the 2016 ESA report (GHD 2017)
- Update of the 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
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1.4 Limitations

This report is subject to the limitations provided in Section 10.

2. Site setting

2.1 Site identification

The following provides a summary of the findings of the GHD 2016 PSI report. This Phase 2 ESA should be read in conjunction with the GHD 2016 PSI report and referred to for further detail.

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

Table 2-1 Site identification and environmental setting summary

Information	Description
Street Address	Airport Road, Albion Park Rail NSW 2527 (Part of Lot 10, DP 1157377)
Site Area	Approximately 15,000 m^2 (1.5 ha), with a perimeter of approximately 1 km
Local Government Area	Shellharbour City Council
Current Land Use	Fire Training site for FRNSW stations around the area to use.
Ownership	Land parcel owned by Shellharbour City Council. Site leased by FRNSW for use as a training facility. The site has been occupied by FRNSW since 1997.

2.2 Surrounding land use and environment

The surrounding land uses and local environment are summarised below in Table 2-2. For further details on each characteristic, refer to the PSI (GHD, 2016) and ESA (GHD, 2017) reports.

Table 2-2 Surrounding land uses and environment

Aspect	Details
Surrounding land uses	• North; Illawarra Rural Fire Services compound and vacant land beyond and zoned IN1 – General Industrial • East; Vegetation identified as Environmentally Sensitive Land in the Terrestrial Biodiversity Map from the Shellharbour City Council Online Mapping system. Residential properties beyond and zoned E3 – Environmental management • South; Boomerang Avenue immediately followed by an airport hangar and Illawarra Regional Airport beyond and zoned SP1 – Special Activities: Air Transport Facility • West; Airport Road and Illawarra Regional Airport beyond and zoned SP1 – Special Activities: Air Transport Facility
Topography	The site has an elevation of approximately 6 m above Australian Height Datum (m AHD), according to Survey data collected as part of the current scope of works. The natural ground level across the investigation area is relatively flat. The regional topography appears to rise to the north, west and south and fall towards Lake Illawarra approximately 650 m east of site

Aspect	Details
Soil and Acid sulphate soils	According to eSPADE from Office of Environment & Heritage, the site is within the Fairy Meadow 'fa' landscape. The Fair Meadow soil landscape has the following characteristics: Landscape: Alluvial plains, floodplains, valley flats and terraces below the Illawarra Escarpment. Local Relief <10 m. Slopes usually <5%. Almost completely cleared low open-forest and woodland. Soils: moderately deep (50-100 cm). Alluvial Loams and Siliceous Sands on terraces. Prairie Soils and Yellow Podzolic Soils occur on the drainage plains. Limitations: flood hazard, low wet bearing strength, highly permeable topsoils, high water tables. The acid sulfate soil class at the site has a low probability of occurrence and at depths greater than 3 metres below the ground surface (reference from the Department of Land and Water Conservation, Albion Park, Acid Sulfate Soil risk map, Edition 2, 1997). The site is situated in AP4 (alluvial plains elevation of >4 m AHD). Around the stormwater channel located to the north of the site there is a zone of AP2 (low probability depths of 2 meters below ground surface) and AP1 (high probability at depths of 1 metre below ground surface) which means the chance of encountering acid sulfate soils increases at these areas

2.3 Geology

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

The site itself appears to sit directly on more recent Quaternary sediments associated with Lake Illawarra and nearby creeks.

2.4 Hydrogeology

The 1:2,000,000 Groundwater in New South Wales, Assessment of Pollution Risk Map indicates the site is likely to be underlain by sandstone in sedimentary basins, which potentially have low hydraulic conductivities. Groundwater salinity is expected to range up to 1000 mg/L, which is suitable for stock, domestic and some irrigation purposes. However, there may be a shallow aquifer system associated with the Quaternary sediments overlying this deeper Permian aquifer.

A groundwater bore search was completed by GHD on 6 July 2017. A review of the Department of Primary Industries All Groundwater Data Map, indicates that there no registered bores within a 1 km radius of the site. The nearest bore is located approximately 1.1 km south-west of site. The bore is a private bore and the intended use is stock, domestic. This well was installed to 30 m with the water bearing zone located around 20 m bgl. This aquifer is a deeper aquifer than the one targeted on-site. Additionally, the water use survey (section 2.6) indicated that an unregistered bore exists on the commercial property located at 10/3 Hargraves Ave, approximately 290 m north-east of the site. The survey respondent indicated that this bore has never been used for beneficial purposes.

2.5 Hydrology

Surface water flow is expected to follow the local topography on site and flow towards the north-east. Dial before you dig underground utilities information did not provide an indication of

stormwater infrastructure through the site. However, it appeared during the site visit that the majority of on site drainage flowed into the retention pond in the north-eastern corner of the site.

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

The drainage lines are presented on Figure 2, Appendix A.

On-site

Surface water bodies relevant to the site include:

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

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

The on-site drainage system all leads to the north eastern corner of the site. Soil bunding surrounds the southern and western corners of the site.

Off-site surface water features

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

2.6 Water use survey

Community engagement efforts have focused on consulting with property owners in the area surrounding the Albion Park training facility to understand water use within the broader investigation area. This involved the distribution of fact sheets, and the hosting of a community meeting and an information session. A *water use survey* was also distributed to a sample set of landowners within the Albion Park area. A water use survey report was produced from the questionnaire and is included in Appendix C. Of the 176 mail out surveys, 27 responses were received and a summary of the key findings are:

- The majority of respondents indicated that they are private residential owners (74%).
- The majority of respondents primarily used town water as their water source (89%). Two respondents specified that their property was supplied by both town water and rain water (7%). One respondent did not specify his/her water source.
- No respondents indicated that they have bores located on their properties.
- Two respondents indicated that they use surface or dam water on their property. One respondent indicated that they have been using dam water since 1989 for both domestic and non-domestic activities including:
  - Domestic use, including drinking, cooking, showering, washing and cleaning;
  - Vegetable watering and fruit tree watering.

  However, upon investigation of this property using aerial imagery and reviewing the owners written answers it is apparent that one property owner may have misinterpreted

the question and was responding to the use of town water, which is supplied by the Sydney Water dam network. This water is treated prior to domestic use and is therefore not relevant to this investigation.

- Three respondents indicated that they or their families use local creeks for recreational purposes (fishing or swimming). One of these families was located north of Albion Creek and indicated that they use Macquarie Rivulet and Yallah Bay. The other two respondents did not indicate which water bodies were used, but also live close to Albion Creek.
- The additional comments of one respondent indicated that Oak Flats High School currently uses bore water. The school is located 3.8 km east of the site. Groundwater is likely to be intercepted by Koona Bay prior to reaching this receptor.

2.7 Site layout and key features

The site boundary is presented in Figure 2, Appendix A.

Key features of the area occupied by FRNSW include the administration buildings and site offices and the main fire training area located to the south of the main driveway to the site. The fire training area was primarily covered with asphalt and GHD understands that the area has not been re-surfaced for at least five years.

There is a surface water retention pond, receiving water draining from the fire training area.

The site is used as a training facility for fire fighters in the surrounding area. The site has one full time and one part time staff member. The site offers different types of training courses throughout the year. The training diary shows that the site can be used up to 15 times in a month. The same person may attend the site for courses around 15 days of the year. The nearby fire stations use the site the most throughout the year for unspecified training and often at these training facilities.

2.8 Conceptual site model

A preliminary conceptual site model (CSM) was prepared by GHD in the PSI report (GHD 2016) and refined in the 2016 ESA report (GHD, 2017). A summary of the CSM is provided below. The CSM was used as the basis for the current investigation works. For further information about the transport mechanisms of PFAS, refer to section 8.3.1 of the 2016 ESA report (GHD, 2017). An updated version of the CSM, based on the outcome of these works, is provided in Section 7.2.

2.8.1 Sources

GHD understands that AFFF containing PFAS is no longer used at the site.

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

- The concrete pad and asphalt surface in the north-eastern area of site, where most AFFF and fuel for ignition are likely to have been used.
- The retention pond in the north-eastern area of site which showed elevated PFAS concentrations.
- The grassed area immediately off-site where overflow of the retention pond would occur.
- All other areas of the site where different fire training scenarios have historically taken place.

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

Other potential historical COPC included total recoverable hydrocarbons (TRH), BTEX (benzene, toluene, ethylbenzene, xylenes) and polycyclic aromatic hydrocarbons (PAHs) from fire accelerants and motor oils from vehicles (historic and current) were included in the 2016 ESA investigation (GHD, 2017). However, analytical results for these compounds were generally low or below the LOR in soil, sediment, surface water and groundwater samples indicating that they are unlikely to be an ongoing source of contamination.

2.8.2 Receptors

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

- Current and future onsite workers.
- Current and future construction/intrusive maintenance (utility) workers (on-site and off-site).
- Residential properties down gradient of the site.
- Users of off-site water bodies for recreational and fishing purposes (namely Koona Bay in Lake Illawarra and Albion Creek).
- Users of groundwater. GHD understands that groundwater is not extracted at the site for any purpose suggesting this may be a low risk. However, the potential for extraction remains both on-site and off-site.
- Aquatic ecological receptors – invertebrates, molluscs, fish, eels etc.
- Terrestrial ecological receptors – local invertebrates (worms, insects etc), mammals, birds, reptiles that might consume impacted animals, plants and surface water.

2.8.3 Exposure pathways

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

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

subsequent discharge to surface waters. The US EPA (2014) notes that PFAS are water soluble and can migrate readily from soil to groundwater, where they can be transported long distances.

2.8.4 Potential source-pathway-receptor linkages

Based on the current information, the following CSM in Table 2-3 has been developed for potential on site sources of contamination and a graphical representation presented in Figure 3, Appendix A. The screening criteria has been updated since the 2016 ESA report (GHD, 2017) was completed. This table has been updated to reflect the new screening criteria.

It is noted that SW05 exceeds the recreational guidelines for PFHxS and PFOS (sum of total) and PFOA. This sample was taken from the retention pond located within the secure Fire and Rescue compound and shown on Figure 2, Appendix A. The retention pond is also fenced off by cyclone fencing and a locked gate. A recreational scenario is not applicable to this location and the likelihood of a human coming into accidental contact with this water is highly unlikely. PFOS is not considered to be a significant dermal risk to human health.

Additionally, as the majority of previous sample analyses were below the laboratory limit of reporting (LOR) for TRH, BTEX and PAHs and the source-pathway-receptor (S-P-R) linkage was not present, the current Phase 2 investigation concentrated on PFAS as the focus of the investigation.

Table 2-3 Updated CSM

Potential Source	Primary pathway	Receptor	Pathway present?
Soils in firefighting training areas	Dermal contact	FRNSW and wider training facility commercial workers and intrusive maintenance workers	Unlikely – PFAS impact detected in all shallow soil samples from this area (all onsite locations) however impact was below the nominated assessment criteria
	Vertical/horizontal migration of leachate through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes – PFAS impact in GW03 and GW04, down gradient of training facility
	Surface runoff and sediment transport	Surface waters (including drainage systems – secondary pathway)	Yes – PFAS detected in sediment samples from surface waters and drainage lines associated with this area.
		Off-site open space	Yes – sediment samples along drainage line contain PFAS
		Off-site ecological	Yes – off-site surface water indicate PFAS impact above ecological screening criteria, which is likely to be associated with the FRNSW site
Surface water retention pond	Dermal contact and ingestion	FRNSW and wider training facility commercial workers	Possible – PFAS impact present greater than drinking water and recreational criterion at SW05. However, the retention pond is enclosed by a fence and locked and therefore limited access.

Potential Source	Primary pathway	Receptor	Pathway present?
	Vertical/horizontal migration of water through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes - PFAS impact in GW03, GW04 and GW05, down gradient of training facility.
		Down gradient surface waters	Yes – Albion Creek and at the outlet to Koona Bay down gradient report PFAS impact
Surface Water off-site – Albion Creek and Lake Illawarra	Dermal contact and ingestion	Down gradient surface waters	Yes – Albion Creek and at the outlet to Koona Bay down gradient report PFAS impact
	Down gradient ecological receptors	Down gradient surface waters	Yes – Albion Creek and at the outlet to Koona Bay down gradient report PFAS impact
Contaminated groundwater	Vertical/horizontal migration	Down gradient surface waters recharged by groundwater	Yes – GW03 and GW04 have PFAS impact above nominated assessment criteria off-site.
		Abstraction bores (stock and/or domestic use)	Unlikely – There are no known user of groundwater down gradient of the site.
Soils impacted by fire accelerants and motor oils from vehicles (historic and current, TRH, BTEX and PAH)	Dermal contact and ingestion and/or Inhalation of vapours and/or Vertical/horizontal migration through unsaturated zone	FRNSW and wider training facility commercial workers, intrusive maintenance workers and/or groundwater	No – the majority of samples below the LOR and all samples below the nominated assessment criteria for each assessed receptor.

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.

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

Step 1: State the problem

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

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

Step 2: Identify the decision/goal of the study

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

- Are contaminants present on the site at concentrations which pose a potentially unacceptable risk to human health or the environment under the current land use (training facility commercial / industrial) and down-gradient land-uses (including residential and recreational land and water uses) based on new screening criteria?
- 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?
- Is the extent of the impact adequately delineated off-site?
- 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, leachate (Australian standard leaching procedure (ASLP)), groundwater and surface water from laboratory analysis.
- Identify potential exposure routes and contamination migration pathways.
- The likelihood of PFAS migrating to groundwater off-site.

Step 4: Define the boundaries of the study

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

Table 3-1 Investigation boundaries

Boundary	Definition
Spatial boundaries	The spatial boundaries for the investigation area are identified as the lateral extent of the sampling locations as shown in Figure 4, Appendix A and down to a depth of approximately 7.2 m bgl, which is the maximum intrusive investigation depth.
Temporal boundaries	The timeframe for this investigation's scope of work primarily defined to the period of works undertaken in the investigation area as part of this assessment; namely May 2017.
Scale of decision making	The scale of the decision making is limited to the boundaries of the investigation area and identified off site receptors
Potential constraints on data collection	Collection of surface water and sediment samples is limited by the availability of the media for sampling at each investigation location.

Step 5: Decision rules

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

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

The decision rule was considered to be:

- If concentrations of the COPC in soil, surface water, or groundwater on or off-site exceed the nominated criteria for permissible land use(s) (as per current zoning), then further assessment of the risks may be required which may lead to adopting an appropriate management strategy.
- Conversely, no further action may be required in the event that concentrations are below nominated 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 D.

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. In summary, the following activities were conducted in May 2017:

- 18 May 2017 – installation of three new groundwater wells and associated soil sampling (GW06 to GW08)
- 25 and 26 May 2017 – groundwater sampling of all monitoring wells (GW01 to GW08), surface water and sediment sampling at nine locations (SW01 to SW09 and SS01 to SS09) on and off-site.

Sampling methodologies were completed with reference to the procedures outlined in the following references:

- 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)
- Western Australia Department of Environment Regulation (WA DER) 2017 *Interim Guideline on the assessment and management of perfluoroalkyl and polyfluoroalkyl substances* Appendix 1 (PFAS specific sample collection methods, equipment and equipment decontamination methods).

4.2 Groundwater well installation and soil sampling soil bore sampling

Table 4-1 Soil bore sampling methodology

Item	Description
Date of fieldwork	18 May 2017
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	National Uniform Drillers Licensing Committee (2011) Minimum Construction Requirements for Water Bores in Australia (Edition 3, 2012) and the WA DER 2017 sampling procedures.
Ground clearance	Scanning using electromagnetic locating prior to mechanical drilling.
Drilling technique	Following hand auguring, push tubing with the tracked geoprobe rig to target depth.
Bore logging	All field observations and subsurface conditions were recorded on borehole logs (Appendix E).
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 the borehole logs in Appendix E.

Item	Description
	PID calibration data is presented in Appendix F.
Soil sampling	Discrete soil samples were collected from the surface and from each lithological zone. Samples for VOC screening were collected in separate snap lock bags. Additionally, soil was sampled into laboratory supplied jars.
Sample Analysis	Two soil samples from each borehole were submitted for laboratory analysis of COPC including PFAS and total organic carbon (TOC).
Sample handling and transport	Following collection, soil samples were immediately placed on ice and stored in a cool, dark environment (esky) prior to being forwarded to the analytical laboratory within the specified holding times along with a chain of custody (COC) form (Appendix G).
QA/QC	A QA/QC sampling procedure was implemented and further details are described in Section 2.8 and Appendix D. QA/QC sampling included one intra-laboratory duplicate sample, one field rinsate and one trip blanks.
Well construction	Wells were installed with the following general characteristics: - 50 mm polyvinyl chloride (PVC) Class 18 blank and screened casings - Primary filter pack material comprising a chemically inert material which was well rounded, with a high coefficient of uniformity and extended at least 0.5 m above the screened PVC casing - Bentonite pellets used as annular sealant which extended at least 0.5 m above the filter pack, followed by a cement slurry to the ground surface - Monitoring wells were finished with trafficable gatic covers and concrete
Development	Well development occurred following installation using bailers until: - No further noticeable sand or silt was recovered - The water was relatively clear when removed from the well - All water was removed from the well
Surveying	Following well installation, all newly installed were surveyed by a registered surveyor. The survey report for the wells is provided in Appendix H.
Waste disposal	Soil cuttings and purged groundwater was transferred to 205 L drums and stored on site. The waste drums have been transferred to a licenced waste facility, with waste disposal documentation provided in Appendix I. The waste disposal included waste generated during both the 2016 ESA and the current stage of investigation.

4.3 Sediment sampling

Table 4-2 Sediment sampling methodology

Item	Description
Date of fieldwork	25 and 26 May 2017
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	GHD's Standard Field Operating Procedures and the WA DER 2017 sampling 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 sediment sample, all non-disposable sampling equipment underwent decontamination including: Washing of equipment with tap water to clean away debris and then rinsed with deionised water.
Sample analysis	All sediment samples were submitted for laboratory analysis of COPC including PFAS and total organic carbon (TOC).
QA/QC	QA/QC sampling included one intra-laboratory duplicate sample, one rinsate and trip blank.

4.4 Groundwater sampling

Table 4-3 Groundwater sampling methodology

Item	Description
Date of fieldwork	25 and 26 May 2017
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	ASTM D6771–02, Standard practice for low-flow purging and sampling for wells and devices used for groundwater quality investigations, ASTM International Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998) Australian Standard 5667:1998 Water Quality – Sampling, Part 11: Guidance on the Sampling of Groundwaters (AS 566.11:1998) WA DER 2017 sampling procedures.
Gauging	Two on-site monitoring wells (GW01 and GW02) and six off-site monitoring wells (GW03, GW04, GW05, GW06, GW07 and GW08) 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 F.
Sampling	All eight monitoring wells were purged and sampled using a peristaltic low flow pump.
Sample handling and transport	Following collection, the groundwater 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 groundwater sample, all non-disposable sampling equipment underwent decontamination including: Washing of equipment with tap water and rinsing of equipment with deionised.
Sample analysis	All groundwater samples (eight) were submitted for laboratory analysis of COPC including PFAS and total dissolved solid (TDS) with the three newly installed wells sampled for total alkalinity. Laboratory certificates of analysis and COC included in Appendix G.
QA/QC	QA/QC sampling included the collection of one intra-laboratory duplicate sample, one rinsate and trip blank.
Waste disposal	Soil cuttings and purged groundwater was transferred to 205 L drums and stored on site. The waste drums have been transferred to a licenced waste

Item	Description
	facility, with waste disposal documentation provided in Appendix I. The waste disposal included waste generated during both the 2016 ESA and the current stage of investigation.

4.5 Surface water sampling

Table 4-4 Surface water sampling methodology

Item	Description
Date of fieldwork	25 and 26 May 2017
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	GHD's Standard Field Operating Procedures and the WA DER 2017 sampling procedures.
Field chemistry	Field parameters temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), reduction-oxidation potential (redox) and temperature of the surface water were also recorded at each sample point using a water quality meter placed directly into a bucket of water from the water body. Field sampling sheets are presented in Appendix F.
Sampling	Surface water samples were collected from locations close to the water's edge using a hand held water sampler fitted with a laboratory provided plastic unpreserved container that was changed between locations.
Sample handling and transport	The surface water samples were then transferred into laboratory provided bottles. placed in 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 and total suspended solids. Laboratory certificates of analysis and COC included in Appendix G.
QA/QC	QA/QC sampling included the collection of one inter-laboratory duplicate sample.
Waste disposal	No excess surface water was collected during surface water sampling.

5. Assessment criteria

5.1 Basis for assessment

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". The office of environment and heritage (OEH) released a Draft PFAS Screening Criteria (May 2017) that provides guidelines values to be use. The OEH also reviewed the Stage 1 ESA (GHD 2017) and provided advice on screening criteria to be used for future assessments at the site.

Published guideline documents currently available and considered as part of this review include:

- CRC CARE 2017. Assessment, management and remediation guidance for perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA) – Part 2: Health screening levels, CRC CARE Technical Report no. 38, CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia.
- Department of Environment and Energy (DoEE), October 2016. DRAFT *Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFAS)*
- EC 2017. Canadian Environmental Protection Act, 1999 Federal Environmental Quality Guidelines Perfluorooctane Sulfonate (PFOS). Environment and Climate Change Canada, February 2017.
- Health 2017. Release of Food Standards Australia New Zealand's (FSANZ) report on: Perfluorinated chemicals in food Supporting Information. Australian Government Department of Health, 31 March 2017.
- OEH/NSW Health 2017. Calculation of Tier I human health PFAS screening values for soil and fish. In preparation**.**
- Western Australia Department of Environment Regulation (WA DER) 2017 *Interim Guideline on the assessment and management of perfluoroalkyl and polyfluoroalkyl substances.*

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. GHD notes that the criteria used differ slightly to those outlined in the letter from the EPA to FRNSW (dated 31/03/2017) as new documentation and guidance has been published since the receipt of that letter. The screening criteria documented herein supersede any criteria previously specified in the site PSI (GHD, 2016) and 2016 ESA (GHD, 2017).

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

5.2 Rationale for assessment criteria

The assessment criteria were selected to allow decisions to be made for the following identified receptors (from Section 2):

- On-site (FRNSW) and off-site commercial workers associated with the surrounding commercial/industrial areas
- Potential intrusive maintenance workers on and off-site

- Beneficial uses of groundwater, including domestic groundwater resources
- Ecological receptors in surface water bodies (including those recharged by groundwater) – A SEPP 14 Coastal Wetland is located at the mouth of Albion Creek and in Lake Illawarra.

The OEH C&R team recommends from the review of the 2016 ESA report (GHD 2017) that commercial / industrial land use is not applicable to fire training activities, as there is the likelihood that site activities may involve greater contact with soil. However, interviews conducted with staff at these facilities state that most training is conducted on hard surfaces and appropriate work wear is required whilst training to limit exposure to the water during training. Therefore, there is minimal exposure to soil during these training scenarios. In addition to this, these training grounds are not in use every day of the week and therefore there is limited exposure to contaminants that are present in the soil, sediment and surface water on the site. GHD considers that the commercial / industrial scenario is applicable to this site and that a more sensitive land use setting is overly conservative since workers are not being exposed daily and nor are they eating food grown on the site or directly being exposed to soils. In addition, dermal exposure to PFAS is not considered a significant risk. The retention pond that is the main source of PFAS on the site is fenced off with a cyclone fence with barbed wired on top of the fence and is locked. Therefore, the risk of direct contact with the pond for the fire fighters using the site is considered to be low.

Residential and commercial screening criteria are included on the results summary tables for reference purpose only.

5.3 Nominated PFAS assessment criteria

The objective of this investigation is focused primarily on PFAS contamination. Therefore, PFAS is the primary COPC which was analysed in samples and the adopted assessment criteria for this investigation are specific for PFAS investigations.

It is noted that no assessment criteria or guidance exists to account for intrusive maintenance workers. Therefore, no specific assessment criteria have been adopted to account for this receptor. Rather, a qualitative assessment based on commercial/industrial guidelines has been conducted.

Additionally there is no assessment criteria for sediment and leachate. The OEH C&R (NSW EPA 31/3/17) state that there is no reliable screening values available for sediments. For comparisons, the sediment samples have been included on the soil assessment table but no exceedances have been highlighted. Leachate data is useful to demonstrate potential for off-site transport. However, as noted by NSW EPA (2017), uncertainties in the relevance of leach testing to real world processes means comparing leachate values to screening values is problematic, even if adjusted for dilution. As such, no screening value or action level have been applied to leachate data.

5.3.1 Soil

The nominated Tier 1 assessment criteria and screening levels for PFAS are outlined in Table 5-1, and are shown on Table A, Appendix B.

Table 5-1 Nominated Tier 1 screening criteria for soil

Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
Health Based			
Residential – off-site	0.009 mg/kg	0.1 mg/kg	Criteria adopted from OEH and NSW Health *Calculation of Tier 1 human health PFAS*

Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
Commercial / industrial	20 mg/kg	100 mg/kg	*screening values for soil and fish* (2017 – in preparation) to account for different landuse activity at off site locations (soil investigation was off-site)
Ecological based			
Soil – direct urban residential and public open space	32 mg/kg	17 mg/kg	Criteria adopted from CRC Care (2017) and only can be used for soil screening on-site as per the OEH C&R document (NSW EPA 31/3/17).
Soil – indirect residential and parkland	0.01 mg/kg (PFOS only)	-	This value accounts for bioaccumulation and/or off-site transport and is recommended by the OEH C&R (NSW EPA 31/3/17) and is from the Canadian Environmental Protection Act, 1999 Federal environmental Quality Guidelines Perfluorooctane Sulfonate (PFOS), (EC 2017).

As per the NSW EPA guidance, there are no reliable values available for sediment and leachate.

5.3.2 Surface water and groundwater

The nominated Tier 1 assessment criteria and screening levels for PFAS are outlined in Table 5-2, and are shown on Table C, Appendix B.

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

- Drinking water
- Aquatic ecosystems

It is likely that a component of groundwater and surface water discharges to a fresh water system (Albion Creek, located approximately 420 m north of the site) and a marine system (Koona Bay, Illawarra Lake 650 m north east of the site). Therefore both fresh water and marine waters have been considered. However, GHD notes that the current guidance for PFAS does not differentiate fresh from marine waters.

GHD notes that direct toxicity for aquatic ecology has been adopted for this assessment. OEH (2017) recommends that secondary poisoning and bioaccumulation should be assessed using biota sampling/analysis (instead of using water) and the wildlife diet screening values provided by Canadian guidelines. This was not considered appropriate for this stage of the assessment, as the extent of contamination was not yet delineated in aquatic environments.

Table 5-2 Nominated Tier 1 screening criteria for surface water and groundwater

Exposure Scenario	PFOS + PFHxS	PFOA	Basis for nomination of criteria
Drinking water quality	0.07 µg/L	0.56 µg/L	Criteria adopted from the Australian Government Department of Health *Release of Food Standards Australia New Zealand report on perfluorinated chemicals in food supporting information* (Health, 2017) as recommended by NSW Office of Environment and Heritage (OEH).

Exposure Scenario	PFOS + PFHxS	PFOA	Basis for nomination of criteria
Recreational water quality	0.7 µg/L	5.6 µg/L	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 and marine waters	0.13 µg/L (PFOS only)	220 µg/L	Criteria adopted for direct toxicity assessment from the Draft Commonwealth Environmental Management Guidance on Perfluorooctance Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) (Australian Government Department of the Environment and Energy (DoEE), 2016). As directed by NSW EPA (2017), a 95% species protection level has been adopted (slightly to moderately disturbed ecosystems).

6. Results

6.1 General

This section presents the results of all soil, sediment, leachate, groundwater and surface water investigations undertaken on the site by GHD in May 2017.

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

- Table A: Soil and sediment analytical results
- Table B: ASLP analytical results
- Table C: Groundwater and surface water analytical results and field parameters 2017
- Table D: Current and previous soil results
- Table E: Current and previous sediment results
- Table F: Current and previous ASLP results
- Table G: Current and previous groundwater and surface water 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 D.

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 (GW06 to GW08). 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 E.

6.3.1 Soil profile

The observed lithology across the three new soil sampling locations is summarised in Table 6-1 and is consistent with the previous profiles from the locations completed during the 2016 ESA (GHD 2017).

Table 6-1 Generalised lithology encountered

Depth range (m)	Lithology
0.0 – 0.35	Clayey SAND (fill)
0.35 – 1.3	Sandy Clay (alluvial)
1.6 – 2.4	Gravelly Clay (alluvial)
2.4 – 4.0	CLAY pale grey mottled brown (alluvial)
4.0 – 6.6	Sandy CLAY, grey (alluvial)

The geology described in Table 2-1 indicated the site is located on alluvial soils, which are likely to be Quaternary sediments. This suggests deposition of relatively recent river-borne material over the Permian basement in the vicinity of the site. The alluvial soils would have implications for the hydrogeological characteristics of the site and PFAS fate and transport.

6.3.2 Soil analytical results

Soil samples were collected from three monitoring wells (GW06 to GW08) installed at various locations off site. The locations are presented in Figure 4 in Appendix A and Table A, Appendix B. Laboratory certificates of analysis are presented in Appendix G.

PFAS summary results

All PFAS concentrations in the soil at the three locations were less than the laboratory level of reporting (LOR). However, the soil samples were recovered from opportunistic locations rather than for a targeted assessment of soil contamination.

6.4 Sediment results

Sediment samples were collected at locations SS01 to SS09. The sediment laboratory results presented in Figure 5 in Appendix A and Table A, Appendix B. Laboratory certificates of analysis are presented in Appendix G.

SS05 reported the maximum concentration of 0.294 mg/kg total PFAS. SS05 is located on-site adjacent to the source location (retention pond) whilst the other sediment sampling locations are located along the down-gradient drainage line and/or Albion Creek.

PFAS was detected at all other sediment locations with the exception of SS02 and SS06.

SS02 is located in Albion Creek up-gradient of the site drainage channel intersection within the airfield. This result suggests that at this location, surface water entering the creek is not impacted with PFAS. SS06 is located in Albion Creek down gradient of the site.

Other samples from Albion Creek reported generally very low PFAS concentrations, including SS04, which is located at the mouth of Albion Creek. Interestingly, PFAS was detected at SS07, which is in a contributory stream and located to the north Albion Creek. This location is considered to be on the other side of the surface water catchment that feeds into Albion Creek and should not receive water from the site. It may indicate an additional source to the north.

Very low concentrations of PFAS were detected in sediment samples recovered from the shores of Lake Illawarra (SS08 and SS09).

There are currently no screening criteria applicable for sediments. However, the eight samples where PFAS was reported, including the source and subsequent down-gradient locations, all reported concentrations of PFAS above the laboratory LOR and therefore still represent a potential on-going source of PFAS to surface water receptors. Further discussion regarding the leachate results is provided in Section 6.5.

6.5 Leachate – ASLP

Eleven (two soil and nine sediment) samples were submitted for ASLP to assess the leaching potential of PFAS from soils (GW06_6.0-6.1 and GW07_5.0-5.1) and sediment (all sediment samples collected). The leachate laboratory results are presented in Table B, Appendix B and the locations are shown on Figure 4, Appendix A. Laboratory certificates of analysis are presented in Appendix G.

No assessment criteria were adopted for ASLP assessment, as per EPA guidance. Table 6-2 shows a comparison between the soil and its respective leachate results.

Table 6-2 Comparisons between soil and Leachate results

Location	PFHxS and PFOS (Sum of Total) - Lab Calc	
	Soil (mg/kg)	Leachate ASLP - µg/L
GW06_6-6.1	<0.0002	6.93

Location	PFHxS and PFOS (Sum of Total) - Lab Calc	
	Soil (mg/kg)	Leachate ASLP - µg/L
GW07_5-5.1	<0.0002	0.54
SS01	0.0409	2.94
SS05	0.267	12.3
SS08	0.005	0.11
SS02	<0.0002	<0.01
SS03	0.0985	1.13
SS04	0.0007	0.03
SS06	<0.0002	0.01
SS09	0.0202	0.48
SS07	0.001	0.03

Concentration of PFAS (sum of total) were detected in leachate from the soil samples at GW06 and GW07 collected within the water table. However, there was no PFAS (sum of total) detected in the soil sample at the same depth or the groundwater collected from this well.

SS06 sediment sample also had a leachate concentration of PFAS (sum of total) of 0.01 µg/L whilst the sediment results for PFAS was less than the LOR.

The results indicate PFAS can potentially leach from the soils and sediments at least under the conditions of an ASLP test. Only one location (SS02) located up-gradient within the airfield had PFAS leachate concentrations less than detection levels. The concentration of total PFAS in leachate from sediment at monitoring location SS05 (retention pond on-site) was a maximum of 12.3 µg/L during this investigation.

6.6 Groundwater and surface water results

6.6.1 Groundwater gauging results

Gauging results are summarised in Table 6-3. 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 6-3 Groundwater Gauging Data

Well ID	Depth of well (m)	Depth to groundwater (m bTOC)	TOC (m AHD)	Corrected groundwater elevation (m AHD)
GW01	6.300	2.985	6.170	3.185
GW02	6.680	3.135	6.293	3.158
GW03	6.240	2.485	5.398	2.913
GW04	6.050	2.292	5.036	2.744
GW05	6.200	2.630	4.814	2.184
GW06	6.300	2.260	4.436	2.176
GW07	5.820	2.408	4.692	2.284
GW08	5.830	1.120	2.384	1.264

Note: TOC = top of casing

A groundwater contour map showing the interpolated groundwater contours and the inferred groundwater flow direction is presented on Figure 6 in Appendix A. Groundwater contours were calculated based on groundwater elevations using an inbuilt ArcGIS interpolation tool to derive the contours with a kriging method. The calculated hydraulic gradient is 0.00335.

The local groundwater flow was interpreted to be in a north-easterly to easterly direction towards Lake Illawarra.

6.6.2 Groundwater quality

Prior to groundwater sample collection, field parameters and observations were recorded during the purging of the well. Field parameters for the site are summarised in Table 6-4 and presented in Table C, Appendix B and the field records are provided in Appendix F.

Table 6-4 Summary of water quality field parameters

Parameter	Results and Comments
pH	pH range was 3.82 (GW07) and 10.19 (GW02)
Temp (°C)	Temperature was between 18.3°C (GW08) and 19.9°C (GW06)
EC (µS/cm)	EC ranged between 2,368 µS/cm (GW06) and 10,089 µS/cm (GW05)
DO (mg/L)	DO ranged between 0.23 mg/L (GW02) and 2.87 mg/L (GW08)
ORP* (mV)	Field redox ranged between 24.7 mV (GW02) and 416.1 mV (GW08)

* Oxidation Reduction Potential

Field parameters were also collected prior to collection of the surface water grab sample. The field parameters have been presented in Table C, Appendix B and notes of the water collected are provided on the field recorded in Appendix F.

6.6.3 Analytical results

Groundwater samples were collected from two on-site wells; GW01 and GW02 and six off-site monitoring wells; GW03, GW04, GW05, GW06, GW07 and GW08. Surface water samples were collected from eight offsite locations; SW01, SW02, SW03, SW04, SW06, SW07, SW08 and SW09 and one on-site location; SW05. The groundwater and surface water laboratory results presented in Figure 7 in Appendix A and Table C, Appendix B Laboratory certificates of analysis are presented in Appendix G.

Groundwater and surface water PFAS concentrations reported in excess of the nominated screening criteria are summarised in Table 6-5. Further discussion pertaining to these exceedances is provided in Section 7.

Table 6-5 Summary groundwater and surface water exceedances

Analyte	Exceedance type	Monitoring location
Sum PFHxS and PFOS	FSANZ – Drinking water (0.07 µg/L)	Surface water – SW01, SW03, SW05 and SW06. Maximum concentration at SW05 (44.1 µg/L). Groundwater –GW01, GW02 (primary and duplicate), GW03 and GW04. Maximum concentration at GW03 (220 µg/L).
	FSANZ – Recreational (0.7 µg/L)	Surface water – SW01, SW03 and SW05 Groundwater - GW01, GW02 (primary and duplicate), GW03
PFOA	FSANZ – Drinking water (0.56 µg/L)	Surface water –SW05 (primary and duplicate) (2.3 µg/L) Groundwater – GW03 (7.21 µg/L)
	FSANZ – Recreational (5.6 µg/L)	Groundwater – GW03 (7.21 µg/L)
PFOS	DoEE FW 95 % (0.13 µg/L)	Surface water – SW01, SW03, SW05 (primary and duplicate). Maximum concentration at SW05 (TQA05) (44 µg/L).

Analyte	Exceedance type	Monitoring location
		Groundwater –GW01, GW02 (primary and duplicate), GW03. Maximum concentration at GW03 (20 µg/L).

7. Discussion

Historical results from the 2016 ESA have been included on the results tables provided in Appendix B, and have been used as a base for comparison for the current PFAS data. This stage of works is focused primarily on PFAS contamination associated with historical use of AFFF. Other contaminants of concern, initially considered during the previous ESA (GHD, 2017) are not discussed further in this report.

7.1 PFAS Contamination status

Based on our review, firefighting training activities are the key issue of concern for the site. The primary contaminants of potential concern (COPC) are therefore PFAS, notably PFOS and PFOA, which were components of former AFFF used on the site.

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 this site, the main discharge area is likely to be Lake Illawarra 650 m east of site, as well as through stormwater drainage to Albion Creek which drains to Lake Illawarra. Lake Illawarra is used commercially for recreational activities and fishing purposes.

7.1.1 Soil and sediment

Soil and sediment on-site

No soil samples recovered during the well installation work in 2017 exceeded the commercial / industrial scenario for human health and ecological nominated screening criteria on-site. However soil samples collected in December 2016 indicated PFAS impact. Soil impacts were significantly higher on-site than off-site, reflecting the PFAS sources i.e. areas previously used for fire fighting training with PFAS AFFF.

The elevated PFAS result from a sediment sample (SS05) in the retention pond also reflects a legacy PFAS impact.

The results of the soil and sediment sampling confirm that the areas of firefighting training that are known to have used AFFF containing PFAS remain impacted, albeit at concentrations below screening criteria adopted for the protection of human health and ecological receptors based on the current industrial land use scenario. As the retention pond is currently isolated from human contact, it does not pose an immediate risk to human health.

The presence of PFAS impact in soils however does constitute a potential source of contamination to the local groundwater and surface water.

Off-site

Soil samples collected off-site in December 2016 that exceeded the residential scenario for protection of human health included samples GW03_0.0-0.1, SB12_0.0-0.1, SB14_0.5-0.6 and SB15_1.0-1.1 for PFHxS and PFOS (sum of total). SB12, SB14 and SB15 were located on from open areas of land that can be accessed by the public, although with no residential dwellings or gardens. However, GW03_0.0-0.1 and SB15_1.0-1.1 exceeded the ecological screening criteria for residential and parkland for PFOS.

The vegetated area identified as environmentally sensitive land on Figure 2, Appendix A is located immediately east of the site. Soil bores (SB11, SB12 and SB13) were completed during

the previous stage of works (GHD, 2017) within this area and detections of PFAS (sum of total) were reported in concentrations below the adopted sensitive ecological guidelines. The vegetation did not indicate any signs of stress or decay suggesting that it has not been visibly adversely impacted by any contamination that might be present in the soils.

The distribution of PFAS in sediment samples indicated that PFAS is likely to be migrating off-site via the surface water drainage pathways. There appears to be a degree of attenuation along the flow path as shown graphically in Chart 1.

It is noteworthy that the sample SS09 appears to show an increase despite its distance from the site. Closer examination of the laboratory results indicated that SS09 PFAS is comprised of PFOS (essentially ubiquitous in all PFAS results) and the longer chain PFAS compounds perfluorodecanoic acid and perfluorododecanoic acid. Other shorter chain PFAS compounds reported in other sediment samples are no longer present in SS09. This may reflect the ability of longer chain compounds to more readily sorb to sediment particles than shorter chain compounds.

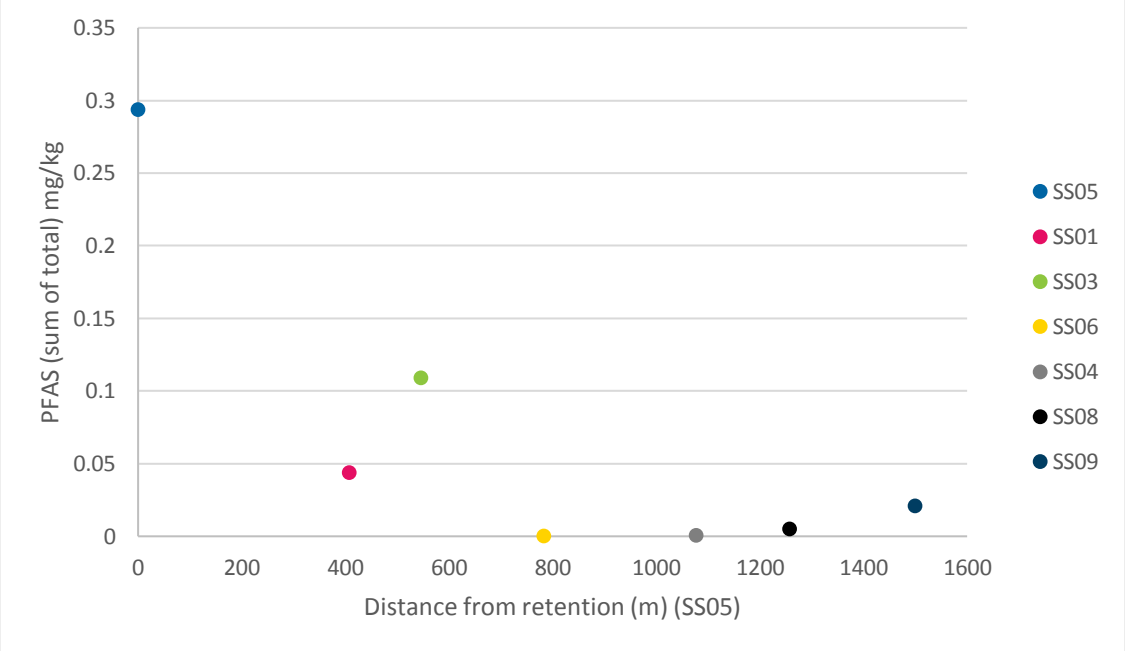

Chart 1 PFAS (sum of total) concentrations in sediment vs distance from source

PFAS leachability

Table 7-1 presents a comparison of total PFAS data and leachable PFAS data and the corresponding calculated percentage of PFAS in leachate. The concentrations of PFAS leaching under ASLP conditions is shown to be relatively consistent across the site for each matrix type and between each location. It is noted that the ASLP testing procedure is more vigorous than natural conditions. Therefore, the percentage of PFAS in leachate is likely to overestimate PFAS leachate occurring in natural conditions at the site. The presence of PFAS in soils and sediments are therefore likely to be acting as an ongoing source of PFAS to groundwater and surface water across the site.

Table 7-1 Leachability calculation of soils, concrete and sediment

Sample ID	Sample matrix type	PFAS (sum of total) concentration		% PFAS in leachate
		Leachate (mg/L)	Soils (mg/kg)	
GW06_6.0-6.1	Soil – Sandy Clay (natural)	0.00693	<0.0002	3465.00%
GW07_5.0-5.1	Soil – Sandy Clay (natural)	0.00054	<0.0002	270.00%
SS01	Sediment- Clayey Sand	0.00297	0.0416	7.14%
SS02	Sediment – Gravelly Sand	<0.00001	<0.0002	n/a
SS03	Sediment – Clay	0.00206	0.105	1.96%
SS04	Sediment – Gravelly Sand	0.00003	0.0007	4.29%
SS05	Sediment - Clay	0.01370	0.273	5.02%
SS06	Sediment – Sand	0.00001	0.0002	5.00%
SS07	Sediment - Clay	0.00003	0.001	3.00%
SS08	Sediment - Clay	0.00011	0.005	2.20%
SS09	Sediment – Sandy Clay	0.00048	0.0202	2.38%

The ASLP results for the soil collected from depth from the groundwater wells GW06 and GW07 seem to be anomalous. The laboratory has re-analysed the ASLP results and the soil results and both were confirmed to be correct. The PFAS result for the soil samples is due to PFOS only whereas the sediment leachate results generally indicated a wider range of PFAS compounds. Given that PFOS is relatively soluble, it is noteworthy that it was not detected in the groundwater from these wells. However, the wells have only been sampled once and may not have adequately equilibrated with the groundwater.

The leachate result for SS09 indicated only PFOS was present. Given the presence of longer chain compounds in the sediment sample, the leachate results suggests these large compounds are not particularly soluble or leachable and may be retained within the sediment in Lake Illawarra.

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.

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

7.1.2 Groundwater and surface water

Groundwater

Groundwater contours indicate that the groundwater is flowing generally to the north-east towards Lake Illawarra. This aligns with the expected groundwater flow from the regional topography, geology and hydrogeology outlined in Section 2.

Concentrations of PFAS have been detected in groundwater both on and off-site. The highest groundwater concentrations of PFAS (sum of total) is at location GW03 which is located directly down-gradient of the retention pond on the boundary fence. The groundwater PFAS concentration has increased significantly from the previous round (46.5 µg/L to 220 µg/L). However, off-site concentrations were either low or below the laboratory LOR. Notably, GW06 and GW07 reported no detectable PFAS. These two wells are within 200 m of GW03 and suggest that migration of PFAS in the groundwater has not resulted in a widespread plume, particularly given the length of time AFFF has been used on the site (approximately 25 years). Mass flux offsite via groundwater therefore may not be a significant transport pathway. The absence of PFAS from GW08, located near the shoreline of Lake Illawarra, further supports this conjecture.

PFAS is present in the offsite well GW05, albeit at low concentrations. This well is located adjacent to a drain leaving the site and where surface water sampling indicated PFAS impact. Given this, it is considered likely that the impact in GW05 is a result of infiltration of PFAS in surface water from the drain rather than indicating widespread advective transport of PFAS via groundwater.

There was a decrease in TDS concentrations reported in the groundwater at all well locations (GW01 to GW05) and all corresponding PFAS (sum of total) concentrations reported an increase during the May 2017 event. Whilst limited information is still available, some 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). As part of the data review, it was noted that the total dissolved solids concentration in groundwater at GW03 had decreased from 11,100 mg/L to 3,220 mg/L. This potential relationship will need to be confirmed with further monitoring.

GW01 and GW02 are located up-gradient from the retention pond and the groundwater results indicate the presence of PFAS at these locations. The presence of PFAS at GW01 and GW02 requires further assessment to identify possible sources. Potential sources for this upgradient impact could be a source located further upgradient on the airfield side or previous activities on the site in this area. Given the relatively high concentrations in these wells, it is unlikely to have resulted from diffusion from a source closer to GW03.

Drinking water exceedances of PFAS were reported in groundwater adjacent the retention pond and down gradient surface waters. Considering that groundwater flow direction is to the north-east towards Lake Illawarra, groundwater conditions down gradient of the source zone have been delineated. The exposure pathway of groundwater being abstracted for potable and or domestic purposes is not considered likely as no registered groundwater abstraction bores are located within 1 km of the site and that there is the availability of local mains water supply and this was confirmed by the water use survey (Section 2.2). There were no respondents indicating that they have a bore on their property.

Surface water

PFAS was detected in the surface water drainage lines leading from the retention pond to Koona Bay, Lake Illawarra. Once off-site, levels of PFAS in surface water decrease with increasing distance from site with SW04 (May 2107), SW07 and SW09 water results for PFAS (sum of total) being below the laboratory LOR and SW08 reporting very low PFOS. SW04 is located near the mouth of Albion Creek and SW08 and SW09 are located in the Lake Illawarra. SW07 is located in a tributary that is not subject to discharge of waters from the site or from Albion Creek. Considering the highly mobile and soluble nature of PFAS this distribution may suggest that AFFF mass flux via the drainage channels is likely to be low. The elevated salinity

in SW04, SW08 and SW09 may also inhibit the solubility of PFAS in the estuarine environment. Combined with the sediment assessment, it is likely that upon discharge to the estuarine environment of Lake Illawarra and the lower reaches of Albion Creek, PFAS may preferentially partition into the sediments. This might suggest that pelagic fish are less likely to be exposed to PFAS compared to demersal fish and benthic organisms.

Off-site surface water locations including SW01 and SW03 water concentrations exceeded the recreational guidelines. Off-site surface water locations that exceed the drinking water criteria include SW01, SW02 (Dec 2016 only), SW03, SW04 (Dec 2016 only), SW06.

As a conservative measure GHD has adopted the DoEE (2016) fresh water ecology criteria (95% species protection level) with water concentrations of PFOS at locations SW01, SW03, SW04 (Dec 2016 only) and SW05 exceeding this screening criteria. The unnamed tributary and Albion Park are used as stormwater channels and unlikely to be used as recreational or drinking water purposed. The nearest surface water body and significant ecological receptor is Lake Illawarra located approximately 650 m north-east of site. Concentrations of PFAS within surface water samples collected near the discharge point (SW04) of Albion Creek to Lake Illawarra and within Koona Bay (SW08 and SW09) all were being the nominated guidelines during the May 2017 round.

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

7.2 Refined CSM

Based on the additional information collected in May 2017, the following CSM has been refined for potential on site sources of contamination in Table 7-2.

Table 7-2 Refined CSM

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

Potential Source	Primary pathway	Receptor	Pathway present?
		Off-site ecological	Yes – off-site surface water indicate PFAS impact above ecological screening criteria, which is likely to be associated with the FRNSW site
Surface water retention pond	Dermal contact and ingestion	FRNSW and wider training facility commercial workers	Unlikely – PFAS impact present greater than drinking water and recreational criterion at SW05. However, the retention pond is enclosed by a fence and locked and therefore limited access.
	Vertical/horizontal migration of water through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes - PFAS impact in GW03, GW04 and GW05, down gradient of training facility.
		Down gradient surface waters	Yes – Albion Creek and at the outlet to Koona Bay down gradient report PFAS impact
Surface Water off-site – Albion Creek and Lake Illawarra	Dermal contact and ingestion	Down gradient surface waters	Yes – Albion Creek and at the outlet to Koona Bay down gradient report PFAS impact
	Down gradient ecological receptors	Down gradient surface waters	Yes – Albion Creek and at the outlet to Koona Bay down gradient report PFAS impact in sediments, surface water and leachate.
Contaminated groundwater	Vertical/horizontal migration	Down gradient surface waters recharged by groundwater	Yes – GW03 and GW04 have PFAS impact above adopted assessment criteria off-site.
		Abstraction bores (stock and/or domestic use)	Unlikely – There are no known user of groundwater down gradient of the site.

7.3 Response to EPA recommendations

The following provides further information requested by the NSW EPA in their letter dated 31/3/17

Soil concentrations

The soil and sediment data for all results have been compared against the updated screening criteria. The vegetated area located to the east of the site has a land use of Environmental Management zone. The objective of the zone as per the Shell Harbour LEP (2013) is to protect, manage and restore areas with special ecological, scientific cultural or aesthetics values. Soil samples collected from the area (SB11, SB12 and SB13) were all below relevant ecological screening criteria. Leachate samples collected from the locations have concentrations of PFAS (sum of total).

Groundwater pathways

Three new groundwater wells were installed down hydraulic gradient of the site. GW06 and GW07 are located approximately 120 m from the site boundary and GW08 approximately 485 m. Through the water use survey (refer to Section 2.2) there are no groundwater bore users in the vicinity. Based on the hydraulic gradient of the site, the groundwater would be connected

with Lake Illawarra. However, the distribution of PFAS in the groundwater wells does not indicate the presence of a widespread groundwater plume.

Local commercial produce

As part of this stage of works, GHD has considered the potential for migration towards rural properties located to the west of the site, beyond the airfield. Following a review of surface water drainage in the area, GHD considers that surface water from the site would not be migrating from the FRNSW site to these properties as the airfield has drainage around the runways directing water away. If it was possible for surface water to migrate towards the airfield these drainage channels would direct the water either towards Albion Creek (in the northern area airfield) or to an unnamed tributary that drains towards Horsley Inlet (in the southern area of the airfield). The water use survey reported that no bores were in use in the area. Further, the results of these works and understanding of local hydrogeological conditions indicates that the groundwater hydraulic gradient is towards the north east and as such, properties located to the west of the site are considered to be hydraulically up-gradient of the FRNSW site and therefore unlikely to be impacted by groundwater leaving the FRNSW site.

Recreational fishing in local area

From the water use survey results, GHD understands that local creeks are used for recreational purposes. Of the three responses which related to recreational use of local creeks, specific uses included:

- Fishing in a rivulet and near the old Power Station on Lake Illawarra,
- Fishing (no specific location provided).
- Fishing and swimming with no location given.

Illawarra Lake has a catchment size of 238 km^2 and covers a surface area 35.8 km^2. The Lake receives surface water runoff from Wollongong, the former Power Station and other industrial areas. Due to the large area of the Lake and over 20 water bodies draining into the Lake, the first part of the process would comprise an assessment of the sediment and biota in the area immediately at the outlet of Albion Creek into Koona Bay. This will allow an understanding if the sediment and biota has been affected by PFAS that then the fish / yabbies and other species could then consume. Based on the surface water sample results and the groundwater results, mass discharge of PFAS from the site into the water column of Lake Illawarra has not been confirmed. The interface between the relatively fresh surface water and groundwater and the saline Lake water is likely to be complex, particularly as salinity has a strong impact on solubility of PFAS.

Ecosystem receptors

PFAS concentrations have been reported in surface water in Albion Creek near the outlet to Lake Illawarra with SW04 in December 2016 (0.19 µg/L) slightly exceeding the ecological screening criteria of 0.13 µg/L in December 2016. All other results including SW04 (May 2017), SW08 and SW09 were below the ecological screening criteria. This shows that the PFAS concentrations are not appearing in the more saline waters of the Lake. The sediment and leachate results from these same locations show low levels of PFAS detected. Based on the discussion above, PFAS may partition into the sediments rather than remain dissolved in the water column. Given this, the main mass of PFAS may reside in the sediments. Further investigation would be required to confirm this hypothesis. This would also provide more justification for the sampling of sediment biota rather than pelagic species in the Lake.

Containment

The on-site retention pond is identified as a priority management action in order to minimise further off-site migration of PFAS impacted sediments and surface water.

8. Conclusions and recommendations

8.1 Conclusions

The overall objective of this investigation was to further characterise impacts and subsequently assess the potential risks to human health and the environment from historical firefighting training activities (specifically those involving PFAS) in the FRNSW site and wider training facility area. Based on the scope of works presented in Section 1.3 of this report, the findings of the investigation and subject to the limitations presented in Section 10, the following conclusions are made:

- Analysis of the soil and sediment samples on-site indicated the following:
  - No soil samples concentrations of PFAS were above the nominated human health screening criteria.
  - No soil samples concentrations of PFAS were above the nominated ecological screening criteria.
  - Sediment sample SS05 has the highest PFAS concentrations in sediment across the site.

  Leachability testing confirmed that PFAS impacted soils and sediments have the potential to release PFAS to the environment at concentrations exceeding the nominated screening levels.
- Analysis of the soil and sediment samples off-site indicated the following:
  - Four soil samples had concentrations of PFHxS and PFOS (sum of total) above the nominated human health screening criteria at GW03, SB12, SB14 and SB15 collected during the December 2016 ESA. The screening criteria is highly conservative for residential when the area is open space.
  - Two samples report concentrations of PFOS above the nominated ecological screening at GW03 and SB15 collected during the December 2016 ESA.
  - All off-site sediment samples reported detects of PFAS with the exception of SS02 and SS06. This indicates that PFAS is likely to be migrating off-site via the surface water drainage pathways.
- Analysis of the groundwater and surface water samples collected during the GME indicated the following:
  - The highest concentration of PFAS contamination in groundwater was GW03 located adjacent to the retention pond.
  - GW01 to GW05 exceed drinking water criteria with GW01, GW02 and GW03 exceeding the recreation criteria.
  - GW01, GW02. GW03 and GW04 exceeded the ecological screening criteria.
  - PFAS was detected in surface water in all the surface water drainage lines leading from the retention pond.
  - Levels of PFAS in surface water decrease with increasing distance from site.
  - Concentrations of PFAS in a surface water sample near the discharge point of Albion Creek to Lake Illawarra exceeded ecological guidelines in December 2016. However, was below the LOR in May 2017. SW08 and SW09 surface water samples collected in Koona Bay, Lake Illawarra were below the nominated ecological guidelines.
- A conceptual site model has been developed for the site and it is considered that complete or potentially complete exposure pathways between PFAS contamination and identified receptors are present.

8.2 Recommendations

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

- Gather further information from the residential survey of water use that have been received to characterise groundwater and surface water use down gradient of the FRNSW site.
- Consideration of immediate management actions that can be implemented to address the mass of PFAS present on site and minimise further migration. These management actions may include, but not be limited to:
  - Assess and implement measures to stop the retention pond on the FRNSW site overflowing, and restrict access/use of the water currently in this dam.
  - Sediment trap on the centralised pit to stop the transport of sediment leaving the site.
  - Removal of impacted water and sediment from the pond.
- Validation sampling should be undertaken following the implementation of any management actions. Sampling should be undertaken to accommodate seasonal fluctuation and, for example, following rainfall events to enable assessment of the areas where surface water collects from the ponds.
- Additional investigation to assess whether impacted groundwater is migrating onto the site from the airfield near GW02 and GW01. Data collected during the additional stage of investigations should include re-sampling of all surface and groundwater bore locations to sample during different seasonality. All wells to be sampled for PFAS and major cations and anions.
- The TDS levels in the groundwater have varied between the two sampling rounds and in some monitoring wells this was very significant. During the first round, the groundwater was indicative of seawater and the surface water results showed a mixing of fresh and seawater. An understanding of potential reason for this significant change over sampling events is required to understand whether the wells are being affected by tidal variation or rainfall. This could include installation of groundwater data loggers for a period of at least two months to capture rainfall events.
- Staged approach to biota sampling in Lake Illawarra to provide understanding of PFAS impacts in the wider environment and assist in the site specific risk assessment process.

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10. 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 50 100 200 300 400 500

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

N

GHD

Fire & Rescue NSW
Albion Park Site Investigation

Site Location and Key Off-site Receptors

Job Number	21-25583
Revision	A
Date	21 Feb 2017

Figure 1

G:\21\25583\GIS\Maps\Deliverables\Albion Park\21_25583_Z001_AlbionPark_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:mweber

LEGEND

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

Paper Size A4

0 20 40 80 120

Metres

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

N

GHD

Fire & Rescue NSW
Albion Park Site Investigation

Job Number 21-25583
Revision A
Date 17 Feb 2017

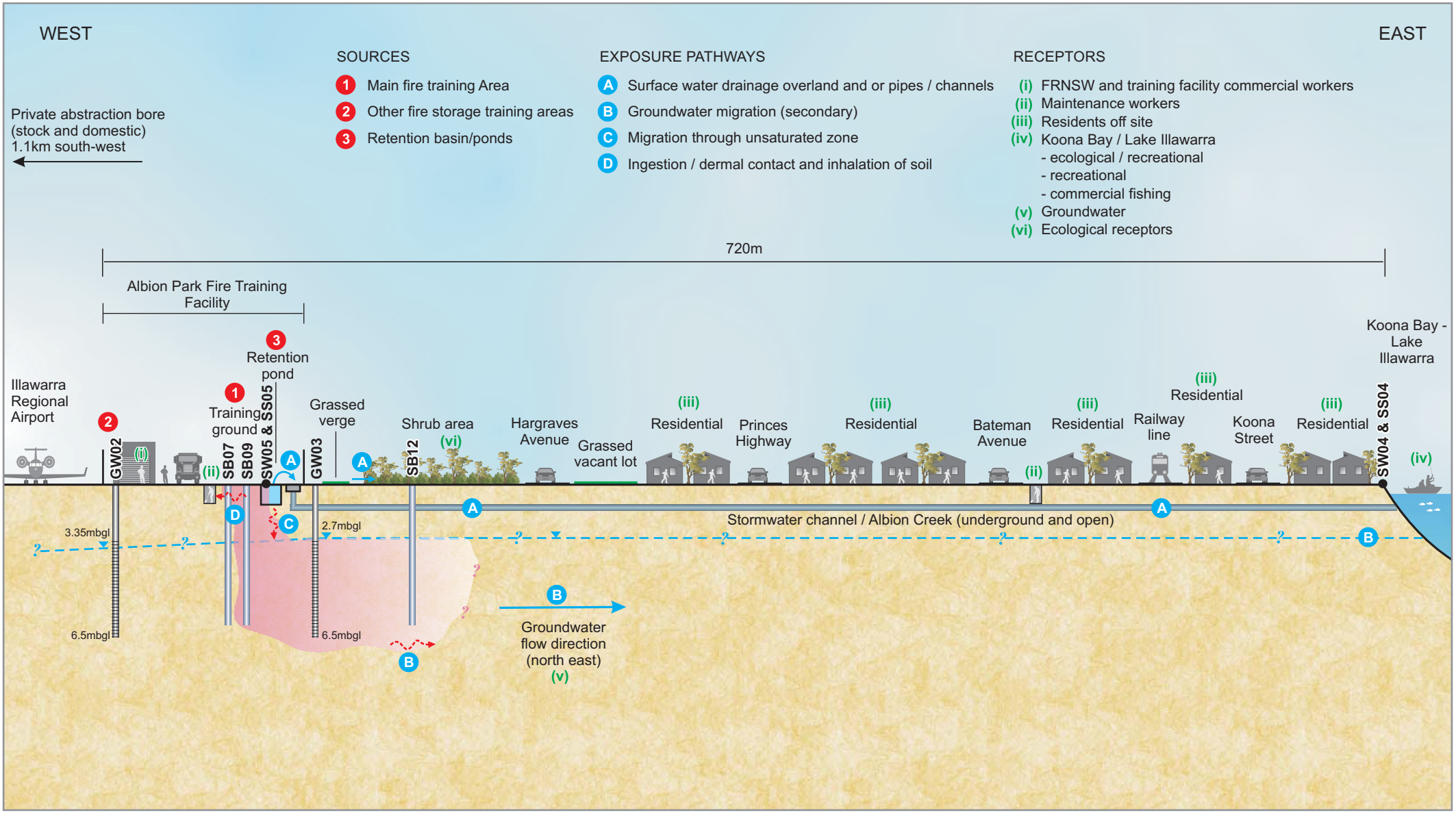
Site Layout

Figure 2

G:\21\25583\GIS\Maps\Deliverables\Albion Park\21_25583_Z002_AlbionPark_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 - ©Land and Property Information (Extracted: 17/02/17); Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



Conceptual diagram only - not to scale

LEGEND

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

Fire & Rescue NSW
Albion Park Fire Training Centre

Conceptual Site Model

Job Number	21-25583
Revision	A
Date	20 Feb 2017

Figure 3

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

LEGEND

- Site Boundary
- Streets
- Major Waterways
- Minor Waterways
- Inferred Surface Drainage (Aboveground)
- Inferred Surface Drainage (Underground)
- Groundwater Monitoring Well (GHD, 2016/2017) (8)
- Soil Borehole (GHD, 2016) (10)
- Sediment Sample Location (GHD, 2016/2017) (9)
- Surface Water Sample Location (GHD, 2016/2017) (9)

0 20 40 60 80 100

Metres

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

N

Fire & Rescue NSW
Albion Park Site Investigation

Job Number 21-25583
Revision A
Date 08 Jun 2017

Investigation Locations

Figure 4

G:\21\25583\GIS\Maps\Deliverables\Albion Park\21_25583_Z012_AlbionPark_InvestigationLocations_May2017.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 2017; Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham

LEGEND

- Site Boundary
- Streets
- Groundwater Elevation Contours (mAHD)
- Major Waterways
- Minor Waterways
- Inferred Surface Drainage (Aboveground)
- Inferred Surface Drainage (Underground)
- Groundwater Monitoring Well (GHD, 2016/2017) (8)
- Soil Borehole (GHD, 2016) (10)
- Sediment Sample Location (GHD, 2016/2017) (9)
- Surface Water Sample Location (GHD, 2016/2017) (9)

0 20 40 60 80 100

Metres

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

N

Fire & Rescue NSW
Albion Park Site Investigation

Job Number 21-25583
Revision A
Date 28 Jun 2017

Groundwater Elevation Contours

Figure 6

G:\21\25583\GIS\Maps\Deliverables\Albion Park\21_25583_Z013_AlbionPark_GWContours_May2017.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 2017; Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham

LEGEND

- Site Boundary
- Streets
- Major Waterways
- Minor Waterways
- Inferred Surface Drainage (Aboveground)
- Inferred Surface Drainage (Underground)
- Groundwater Monitoring Well (GHD, 2016/2017) (8)
- Soil Borehole (GHD, 2016) (10)
- Sediment Sample Location (GHD, 2016/2017) (9)
- Surface Water Sample Location (GHD, 2016/2017) (9)

0 20 40 60 80 100
Metres

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

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Fire & Rescue NSW
Albion Park Site Investigation

Job Number 21-25583
Revision A
Date 28 Jun 2017

Sediment Results

Figure 5

G:\21\25583\GIS\Maps\Deliverables\Albion Park\21_25583_Z014_AlbionPark_Sediment_Results.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 2017; Streets, Waterways - NSW LPI 2012 DTDB. Created by:tnham

LEGEND

- Site Boundary
- Streets
- Major Waterways
- Minor Waterways
- Inferred Surface Drainage (Aboveground)
- Inferred Surface Drainage (Underground)
- Groundwater Monitoring Well (GHD, 2016/2017) (8)
- Soil Borehole (GHD, 2016) (10)
- Sediment Sample Location (GHD, 2016/2017) (9)
- Surface Water Sample Location (GHD, 2016/2017) (9)

0 20 40 60 80 100
Metres

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

N

GHD

Fire & Rescue NSW
Albion Park Site Investigation

Groundwater and Surface Water Exceedances

Job Number 21-25583
Revision A
Date 28 Jun 2017

Figure 7

G:\21\25583\GIS\Maps\Deliverables\Albion Park\21_25583_Z015_AlbionPark_Water_Exceedances.mxd
Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Appendix B – Analytical result summary tables

Appendix I
Table A
Soil and Sediment Analytical Results

						TOC	Inorganics		PFAS																													
						Total Organic Carbon	pH (Final)	Moisture	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	Perfluorotelomer sulfonic acid 10:2	Fluorotelomers sulfonic acid 4:2	Fluorotelomers sulfonic acid 6:2	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	Fluorotelomers sulfonic acid 8:2	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	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)
						%	pH Units	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.02	0.1	1	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
OEH/NSW Health 2017 Human Health Residential																*0.009*											*0.1*										
OEH/NSW Health 2017 Commercial / Industrial																20											100										
CRC Care 2017 Tech Report 28 PFAS ESL Urban Residential and Public Open Space																											[#1] 17										
EC2017 Ecological residential and parkland																																			32[#2] 0.01			
SampleCode	Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time																																		
SOIL																																						
ES1712281004	GW06_3.0-3.1	GW06	3-3.1	18/05/2017		0.1	-	18.4	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281007	GW06_6.0-6.1	GW06	6-6.1	18/05/2017		0.12	7.6	19	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281008	TQA01	GW06	6-6.1	18/05/2017		-	-	18.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281014	GW07_3.0-3.1	GW07	3-3.1	18/05/2017		0.12	-	17.4	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281017	GW07_5.0-5.1	GW07	5-5.1	18/05/2017		0.03	7.4	16.2	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281022	GW08_2.0-2.1	GW08	2-2.1	18/05/2017		0.12	-	15.4	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281025	GW08_5.0-5.1	GW08	5-5.1	18/05/2017		0.03	-	14.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SEDIMENTS																																						
ES1712870013	SS01	SS01		25/05/2017		3.85	6.5	51.3	<0.0002	0.0014	0.0002	<0.0005	<0.0005	<0.0002	0.0409	<0.0002	0.0016	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0002	0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.0393	0.0007	<0.0005	<0.0002	<0.0002	0.0441	0.0416
ES1712870024	SS02	SS02		25/05/2017		0.42	7.8	28.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712870025	SS03	SS03		25/05/2017		13.3	6.8	67.3	<0.0002	<0.0002	0.0015	<0.0005	<0.0005	<0.0002	0.0985	0.0012	0.0142	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	0.002	<0.001	<0.0002	<0.0002	0.0008	0.003	0.0002	0.0843	<0.0002	<0.0005	<0.0002	<0.0002	0.109	0.105
ES1712870026	SS04	SS04		25/05/2017		0.14	8.3	32	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0007	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.0005	<0.0002	<0.0002	0.0007	0.0007
ES1712870014	SS05	SS05		25/05/2017		0.33	6.4	34.8	0.0003	0.008	0.0005	<0.0005	<0.0005	0.0006	0.267	0.0003	0.0039	<0.0002	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	0.0004	<0.001	<0.0002	<0.0002	0.0003	0.0029	<0.0002	0.263	0.0118	<0.0005	<0.0002	<0.0002	0.294	0.273
ES1712870016	TQA06	SS05		25/05/2017		-	-	29.2	<0.0002	0.0044	0.0003	<0.0005	<0.0005	0.0004	0.103	0.0002	0.0022	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.002	<0.0002	0.101	0.0031	<0.0005	<0.0002	<0.0002	0.115	0.106
ES1712870027	SS06	SS06		25/05/2017		0.88	8.2	31.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712870028	SS07	SS07		25/05/2017		2.92	7.6	34.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.001	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.001	0.001
ES1712870015	SS08	SS08		25/05/2017		2.62	7.6	46.8	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.005	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	0.005	<0.0002	<0.0005	<0.0002	<0.0002	0.0053	0.005
ES1712870029	SS09	SS09		25/05/2017		0.3	7.4	36	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0202	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0006	0.0002	<0.0002	<0.0002	<0.0002	0.0202	<0.0002	<0.0005	<0.0002	<0.0002	0.021	0.0202
Statistical Summary																																						
Number of Results						15	11	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Number of Detects						15	11	17	1	3	4	0	0	2	8	3	4	0	1	0	0	0	0	0	4	4	0	2	1	2	4	1	8	3	0	0	0	8	8
Minimum Concentration						0.03	6.4	14.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Minimum Detect						0.03	6.4	14.1	0.0003	0.0014	0.0002	ND	ND	0.0004	0.0007	0.0002	0.0016	ND	0.0008	ND	ND	ND	ND	ND	ND	0.0002	0.0002	ND	0.0003	0.0002	0.0003	0.0005	0.0002	0.0007	0.0007	ND	ND	ND	0.0007	0.0007
Maximum Concentration						13.3	8.3	67.3	0.0003	0.008	0.0015	<0.0005	<0.0005	0.0006	0.267	0.0012	0.0142	<0.0002	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	0.002	<0.001	0.0006	0.0002	0.0008	0.003	0.0002	0.263	0.0118	<0.0005	<0.0002	<0.0002	0.294	0.273
Maximum Detect						13.3	8.3	67.3	0.0003	0.008	0.0015	ND	ND	0.0006	0.267	0.0012	0.0142	ND	0.0008	ND	ND	ND	ND	ND	ND	0.0016	0.002	ND	0.0006	0.0002	0.0008	0.003	0.0002	0.263	0.0118	ND	ND	ND	0.294	0.273
Average Concentration						1.7	7.4	30	0.00011	0.00089	0.00022	0.00025	0.00025	0.00015	0.032	0.00018	0.0014	0.0001	0.00028	0.00025	0.00025	0.00025	0.00025	0.00025	0.00032	0.00025	0.0005	0.00014	0.00011	0.00015	0.00057	0.00011	0.03	0.001	0.00025	0.0001	0.0001	0.035	0.033
Median Concentration						0.3	7.6	29.2	0.0001	0.0001	0.0001	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.0001	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00025	0.0001	0.0001	0.0001	0.0001
Standard Deviation						3.4	0.62	15	0.000049	0.0021	0.00035	0	0	0.00014	0.069	0.00027	0.0035	0	0.00013	0	0	0	0	0	0.0005	0.00046	0	0.00013	0.000024	0.00017	0.001	0.000024	0.067	0.0029	0	0	0	0.076	0.071

Env Stds Comments
#1:80% species protection
#2:85% species protection

Appendix B
Table B
ASLP Leachate Results 2017

								PFAS																										
								N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
								µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL								0.02	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01
SampleCode	**Field_ID**	**Location_Code**	**Sample_I**	**Sampled_Date_Time**	**Matrix_Type**	**Matrix**																																
ES1712281007	GW06_6.0-6.1	GW06	6-6.1	18/05/2017	soil	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	6.93	<0.02	0.07	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	6.86	<0.02	<0.05	<0.02	<0.02	6.93	6.93
ES1712281017	GW07_5.0-5.1	GW07	5-5.1	18/05/2017	soil	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.54	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.54	<0.02	<0.05	<0.02	<0.02	0.54	0.54
ES1712870013	SS01	SS01		25/05/2017	sediment	ASLP		<0.02	0.02	<0.02	<0.05	<0.05	<0.02	2.94	<0.02	0.1	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	2.84	<0.02	<0.05	<0.02	<0.02	2.97	2.95
ES1712870024	SS02	SS02		25/05/2017	sediment	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870025	SS03	SS03		25/05/2017	sediment	ASLP		<0.02	<0.02	0.02	<0.05	<0.05	<0.02	1.13	0.05	0.3	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.04	0.7	<0.02	<0.02	0.02	0.07	<0.02	0.83	<0.02	<0.05	<0.02	<0.02	2.06	2
ES1712870026	SS04	SS04		25/05/2017	sediment	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	0.03	0.03
ES1712870014	SS05	SS05		25/05/2017	sediment	ASLP		<0.02	0.35	0.02	<0.05	<0.05	<0.02	12.3	0.07	0.34	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	0.04	<0.1	<0.02	<0.02	0.03	0.39	<0.02	12	0.25	<0.05	<0.02	<0.02	13.7	13
ES1712870027	SS06	SS06		25/05/2017	sediment	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.05	<0.02	<0.02	0.01	0.01
ES1712870028	SS07	SS07		25/05/2017	sediment	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	0.03	0.03
ES1712870015	SS08	SS08		25/05/2017	sediment	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.11	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.11	<0.02	<0.05	<0.02	<0.02	0.11	0.11
ES1712870029	SS09	SS09		25/05/2017	sediment	ASLP		<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.48	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.48	<0.02	<0.05	<0.02	<0.02	0.48	0.48
Statistical Summary																																						
Number of Results								11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Number of Detects								0	2	2	0	0	0	10	2	4	1	0	0	0	0	0	0	3	2	1	0	0	2	2	0	10	1	0	0	0	10	10
Minimum Concentration								<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
Minimum Detect								ND	0.02	0.02	ND	ND	ND	0.01	0.05	0.07	0.03	ND	ND	ND	ND	ND	ND	0.01	0.04	0.7	ND	ND	0.02	0.07	ND	0.01	0.25	ND	ND	ND	0.01	0.01
Maximum Concentration								<0.02	0.35	0.02	<0.05	<0.05	<0.02	12.3	0.07	0.34	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	0.04	0.7	<0.02	<0.02	0.03	0.39	<0.02	12	0.25	<0.05	<0.02	<0.02	13.7	13
Maximum Detect								ND	0.35	0.02	ND	ND	ND	12.3	0.07	0.34	0.03	ND	ND	ND	ND	ND	ND	0.14	0.04	0.7	ND	ND	0.03	0.39	ND	12	0.25	ND	ND	ND	13.7	13
Average Concentration								0.01	0.042	0.012	0.025	0.025	0.01	2.2	0.019	0.08	0.012	0.025	0.025	0.025	0.025	0.025	0.025	0.02	0.015	0.11	0.01	0.01	0.013	0.05	0.01	2.2	0.032	0.025	0.01	0.01	2.4	2.4
Median Concentration								0.01	0.01	0.01	0.025	0.025	0.01	0.48	0.01	0.01	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.005	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.48	0.01	0.025	0.01	0.01	0.48	0.48
Standard Deviation								0	0.1	0.004	0	0	0	3.9	0.021	0.12	0.006	0	0	0	0	0	0	0.04	0.012	0.2	0	0	0.0065	0.11	0	3.9	0.072	0	0	0	4.3	4.1
Number of Guideline Exceedances								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

Appendix B
Table C
Groundwater and Surface Water Analytical Results and Field Parameters

				Field Parameters						Inorganics		PFAS																										
				Purge Volume	DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)	Total Suspended Solids	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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)
				L	mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL										10	5	0.02	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01
Commonwealth (Draft) Env. Mgmt. Guidance on PFAS - FW & MW 95%																												220							0.13						
FSANZ - PFAS Drinking water quality guideline																		*0.07*										*0.56*												
FSANZ - PFAS Recreational water quality guideline																		0.7										5.6												
SampleCode	Field_ID	Location_Code	Sampled_Date																																					
ES1712870001	GW01	GW01	25-May-17	7	2.75	5238	6.83	118.6	19.8	4430	-	<0.02	<0.02	0.08	<0.05	<0.05	<0.02	1.45	0.26	1.1	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.21	<0.1	<0.02	<0.02	<0.02	0.13	<0.02	0.35	<0.02	<0.05	<0.02	<0.02	2.16	1.87
ES1712870002	GW02	GW02	25-May-17	7	0.23	4464	10.19	24.7	19.4	2980	-	<0.02	<0.02	0.21	<0.05	<0.05	<0.02	19	2.76	15.4	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	2.37	<0.1	<0.02	<0.02	0.07	0.69	<0.02	3.56	<0.02	<0.05	<0.02	<0.02	25.4	22.8
ES1712870009	TQA04	GW02	25-May-17	-	-	-	-	-	-	-	394	<0.02	<0.02	0.22	<0.05	<0.05	<0.02	19.7	2.73	16	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	2.38	<0.1	<0.02	<0.02	0.08	0.64	<0.02	3.66	<0.02	<0.05	<0.02	<0.02	26	23.4
ES1712870003	GW03	GW03	25-May-17	9	2.13	4889	5.24	163.1	18.7	3220	-	<0.02	<0.02	6.31	<0.05	<0.05	<0.02	220	47	200	11.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.52	7.21	44	5.2	<0.02	<0.02	4.85	50	<0.02	20	<0.02	<0.05	<0.02	<0.02	398	348
ES1712870004	GW04	GW04	25-May-17	8	2.47	5445	5.19	235.1	19.2	4530	-	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.11	0.03	0.08	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	0.14	0.14
ES1712870005	GW05	GW05	25-May-17	6	2.62	10,089	3.96	244.4	19.4	6210	-	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.06	0.05	0.04	<0.02	<0.05	<0.05	0.51	<0.05	<0.05	<0.05	<0.01	0.03	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.02	<0.02	0.65	0.11
ES1712870006	GW06	GW06	25-May-17	6	1.29	2368	4.55	189.4	19.9	1840	-	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870007	GW07	GW07	25-May-17	6	1.71	9960	3.82	335.2	19.2	6400	-	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870008	GW08	GW08	25-May-17	6	2.87	6090	4.54	416.1	18.3	4610	-	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870010	SW01	SW01	25-May-17	-	3.44	334.4	5.78	229.7	12.8	-	-	<0.02	<0.02	0.05	<0.05	<0.05	<0.02	2.45	0.16	0.82	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.15	<0.1	<0.02	<0.02	0.02	0.14	<0.02	1.63	<0.02	<0.05	<0.02	<0.02	3.01	2.81
ES1712870018	SW02	SW02	25-May-17	-	5.34	664	7.85	234.5	13.2	-	7	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870019	SW03	SW03	25-May-17	-	0.98	352.8	7.31	143.8	11.5	-	408	<0.02	<0.02	0.03	<0.05	<0.05	<0.02	1.27	0.07	0.36	<0.02	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	0.02	0.06	<0.1	<0.02	<0.02	<0.02	0.05	<0.02	0.91	<0.02	<0.05	<0.02	<0.02	1.55	1.41
ES1712870020	SW04	SW04	25-May-17	-	3.8	39,258	7.36	291.2	14.6	-	<5	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870011	SW05	SW05	25-May-17	-	5.32	136.6	7.56	174.3	14.5	-	12	<0.02	0.11	0.74	<0.05	<0.05	<0.02	44.1	1.74	11.3	0.88	0.09	<0.05	<0.05	<0.05	<0.05	1.3	1.86	1.74	0.8	<0.02	<0.02	0.65	4.36	0.04	32.8	0.24	<0.05	<0.02	<0.02	58.6	55.8
S17-My28782	TQA05	SW05	25-May-17	-	-	-	-	-	-	-	-	<0.05	0.34[#1]	0.78[#1]	<0.01	<0.01	<0.05	-	1.5	9.2[#1]	1.9	0.06	<0.05	<0.05	<0.05	<0.05	0.51	2.3[#1]	1.4[#1]	0.99	0.02[#1]	<0.01[#1]	0.88[#1]	6.7[#1]	0.07[#1]	44[#1]	0.2	<0.01	<0.01	<0.01	-	-
ES1712870021	SW06	SW06	25-May-17	-	12.35	1228	8.71	215.2	9.2	-	26	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.15	<0.02	0.09	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	0.15	0.15
ES1712870022	SW07	SW07	25-May-17	-	0.15	350.8	7.06	210.1	12.5	-	10,600	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870012	SW08	SW08	25-May-17	-	5.02	43,275	6.98	323.3	19	-	706	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	0.06	0.06
ES1712870023	SW09	SW09	25-May-17	-	6.38	38,631	7.6	300.7	13.8	-	14	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
Statistical Summary																																									
Number of Results				8	17	17	17	17	17	8	9	19	19	19	19	19	19	18	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	18	18
Number of Detects				8	17	17	17	17	17	8	8	0	2	8	0	0	0	11	10	11	5	2	0	2	0	0	3	8	9	3	1	0	6	8	2	12	2	0	0	0	11	11
Minimum Concentration				6	0.15	136.6	3.82	24.7	9.2	1840	<5	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Minimum Detect				6	0.15	136.6	3.82	24.7	9.2	1840	7	ND	0.11	0.03	ND	ND	ND	0.06	0.03	0.04	0.18	0.06	ND	0.05	ND	ND	0.51	0.02	0.03	0.8	0.02	ND	0.02	0.05	0.04	0.02	0.2	ND	ND	ND	0.06	0.06
Maximum Concentration				9	12.35	43275	10.19	416.1	19.9	6400	10600	<0.05	0.34	6.31	<0.05	<0.05	<0.05	220	47	200	11.4	0.09	<0.05	0.51	<0.05	<0.05	2.52	7.21	44	5.2	0.02	<0.02	4.85	50	0.07	44	0.24	<0.05	<0.02	<0.02	398	348
Maximum Detect				9	12.35	43275	10.19	416.1	19.9	6400	10600	ND	0.34	6.31	ND	ND	ND	220	47	200	11.4	0.09	ND	0.51	ND	ND	2.52	7.21	44	5.2	0.02	ND	4.85	50	0.07	44	0.24	ND	ND	ND	398	348
Average Concentration				6.9	3.5	10163	6.5	226	16	4278	1352	0.011	0.033	0.45	0.024	0.024	0.011	17	3	13	0.77	0.03	0.025	0.052	0.025	0.025	0.25	0.62	2.8	0.41	0.011	0.0097	0.35	3.3	0.015	5.6	0.032	0.024	0.0097	0.0097	29	25
Median Concentration				6.5	2.75	4889	6.98	229.7	18.3	4480	26	0.01	0.01	0.01	0.025	0.025	0.01	0.085	0.03	0.08	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.005	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.06	0.01	0.025	0.01	0.01	0.145	0.125
Standard Deviation				1.1	2.9	14784	1.8	92	3.5	1567	3477	0.0034	0.078	1.4	0.0046	0.0046	0.0034	52	11	46	2.6	0.017	0	0.11	0	0	0.63	1.7	10	1.2	0.0023	0.0011	1.1	11	0.015	13	0.067	0.0046	0.0011	0.0011	93	82
Number of Guideline Exceedances				0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	8	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	8	0	0	0	0	0	0

Env Stds Comments

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.
#2 Redox field parameters has been adjusted by +205 from field mesurements

Appendix B
Table C
Groundwater and Surface Water Analytical Results and Field Parameters

	Alkalinity			
	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3
	mg/L	mg/L	mg/L	mg/L
EQL	1	1	1	1
Commonwealth (Draft) Env. Mgmt. Guidance on PFAS - FW & MW 95%				
FSANZ - PFAS Drinking water quality guideline				
FSANZ - PFAS Recreational water quality guideline				
SampleCode	Field_ID	Location_Code	Sampled_Date				
ES1712870001	GW01	GW01	25-May-17	-	-	-	-
ES1712870002	GW02	GW02	25-May-17	-	-	-	-
ES1712870009	TQA04	GW02	25-May-17	-	-	-	-
ES1712870003	GW03	GW03	25-May-17	-	-	-	-
ES1712870004	GW04	GW04	25-May-17	-	-	-	-
ES1712870005	GW05	GW05	25-May-17	-	-	-	-
ES1712870006	GW06	GW06	25-May-17	-	-	-	-
ES1712870007	GW07	GW07	25-May-17	-	-	-	-
ES1712870008	GW08	GW08	25-May-17	-	-	-	-
ES1712870010	SW01	SW01	25-May-17	-	-	-	-
ES1712870018	SW02	SW02	25-May-17	-	-	-	-
ES1712870019	SW03	SW03	25-May-17	-	-	-	-
ES1712870020	SW04	SW04	25-May-17	-	-	-	-
ES1712870011	SW05	SW05	25-May-17	-	-	-	-
S17-My28782	TQA05	SW05	25-May-17	-	-	-	-
ES1712870021	SW06	SW06	25-May-17	29	<1	127	98
ES1712870022	SW07	SW07	25-May-17	<1	<1	163	163
ES1712870012	SW08	SW08	25-May-17	<1	<1	112	112
ES1712870023	SW09	SW09	25-May-17	<1	<1	106	106
Statistical Summary							
Number of Results				4	4	4	4
Number of Detects				1	0	4	4
Minimum Concentration				<1	<1	106	98
Minimum Detect				29	ND	106	98
Maximum Concentration				29	<1	163	163
Maximum Detect				29	ND	163	163
Average Concentration				7.6	0.5	127	120
Median Concentration				0.5	0.5	119.5	109
Standard Deviation				14	0	26	29
Number of Guideline Exceedances				0	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0

Env Stds Comments

Data Comments
#1 Quantification of linear and branched isomers has been conducted as a sir
#2 Redox field parameters has been adjusted by +205 from field mesurement

Appendix I
Table D
Soil Analytical Results - Combined

					TOC	PFAS																								
					Total Organic Carbon	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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
					%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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					0.02	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002
OEH/NSW Health 2017 Human Health Residential												*0.009*										*0.1*							
OEH/NSW Health 2017 Commercial / Industrial												**20**										**100**							
EC2017 Soil Indirect Ecological residential and parkland												22																	
EC2017 Ecological Soil indirect Commercial and industrial												90																	
CRC Care 2017 Tech Report 28 PFAS ESL Commercial & Industrial																						48[#1]							
CRC Care 2017 Tech Report 28 PFAS ESL Urban Residential and Public Open Space																						17[#4]							
SampleCode	**Field_ID**	**Location_Code**	**Sample_Depth (m)**	**Sampled_Date**																										
ON-SITE																														
ES1628401033	GW01_0.0_0.2	GW01	0-0.2	06-Dec-16	-	<0.0002	<0.0002	0.0015	<0.0005	<0.0005	<0.0002	*0.0347*	0.0015	0.0154	0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0018	0.001	<0.001	<0.0002	<0.0002	0.0014	0.0042	<0.0002
ES1628401038	GW01_4.0_4.1	GW01	4-4.1	06-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401026	GW02_0.5_0.6	GW02	0.5-0.6	06-Dec-16	0.8	<0.0002	<0.0002	0.0007	<0.0005	<0.0005	<0.0002	*0.0603*	0.0024	0.034	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	0.0014	<0.001	<0.0002	<0.0002	0.0002	0.0028	<0.0002
ES1628401031	GW02_5.0_5.1	GW02	5-5.1	06-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.002	<0.0002	0.0008	<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
ES1628401041	SB06_0.5_0.6	SB06	0.5-0.6	06-Dec-16	-	<0.0005	0.0036	0.0506	<0.0005	<0.0005	<0.0005	*3.73*	0.0055	0.164	0.0036	<0.0005	<0.0012	<0.0012	<0.0012	<0.0012	<0.0005	0.0599	0.007	<0.001	<0.0005	<0.0005	0.0086	0.0163	<0.0005
ES1628401043	SB06_2.0_2.1	SB06	2-2.1	06-Dec-16	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ES1628401046	SB06_5.0_5.1	SB06	5-5.1	06-Dec-16	-	<0.0002	<0.0002	0.0032	<0.0005	<0.0005	<0.0002	*0.0959*	0.0153	0.0733	0.0038	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0043	0.0054	0.0102	<0.001	<0.0002	<0.0002	0.0043	0.0193	<0.0002
ES1628401048	SB07_ASHPALT_0.0_0.3	SB07	0-0.3	05-Dec-16	-	<0.0002	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	*0.0146*	<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
ES1628401050	SB07_0.5_0.6	SB07	0.5-0.6	05-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0035	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401053	SB07_3.0_3.1	SB07	3-3.1	05-Dec-16	<0.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0037	<0.0002	0.0005	<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	0.0003	<0.0002
ES1628401058	SB08_0.5_0.6	SB08	0.5-0.6	05-Dec-16	-	<0.0002	<0.0002	0.0046	<0.0005	<0.0005	<0.0002	*0.138*	0.0005	0.0137	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0019	0.0013	<0.001	<0.0002	<0.0002	0.0005	0.004	<0.0002
ES1628401060	SB08_2.0_2.1	SB08	2-2.1	05-Dec-16	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ES1628401063	SB08_5.0_5.1	SB08	5-5.1	05-Dec-16	-	<0.0002	<0.0002	0.0003	<0.0005	<0.0005	<0.0002	*0.0103*	0.002	0.0103	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	0.0027	<0.001	<0.0002	<0.0002	0.0005	0.0063	<0.0002
ES1628401066	SB09_0.5_0.6	SB09	0.5-0.6	05-Dec-16	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ES1628401065	SB09_0.0_0.1	SB09	0-0.1	05-Dec-16	-	0.0004	0.0218	0.104	0.0008	<0.0005	0.0005	*4.21*	0.0172	0.143	0.0231	0.0028	<0.0005	<0.0005	<0.0005	<0.0005	0.0175	0.0671	0.0431	0.012	0.0015	<0.0002	0.0136	0.127	<0.0002
ES1628401070	SB09_4.0_4.1	SB09	4-4.1	06-Dec-16	-	<0.0002	<0.0002	0.0033	<0.0005	<0.0005	<0.0002	*0.0903*	0.0056	0.0444	0.0044	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0013	0.0049	0.0091	<0.001	<0.0002	<0.0002	0.0028	0.0299	<0.0002
ES1628401073	SB10_0.0_0.1	SB10	0-0.1	06-Dec-16	-	<0.0002	<0.0002	0.0079	<0.0005	<0.0005	<0.0002	*0.146*	0.0004	0.0496	0.0075	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0097	0.0027	<0.001	<0.0002	<0.0002	0.0039	0.0169	0.0002
ES1628401077	SB10_2.3_2.5	SB10	2.3-2.5	06-Dec-16	<0.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0013	<0.0002	0.0006	<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
OFF-SITE																														
ES1628401017	GW03_0.0_0.1	GW03	0-0.1	07-Dec-16	-	<0.0002	0.0008	0.0185	<0.0005	<0.0005	<0.0002	*0.816*	0.0147	0.14	0.0081	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0243	0.0099	0.001	<0.0002	<0.0002	0.0105	0.0323	<0.0002
ES1628401023	GW03_5.0_5.1	GW03	5-5.1	07-Dec-16	<0.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0005	0.0002	0.0005	<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	0.0003	<0.0002
ES1628401010	GW04_0.5_0.6	GW04	0.5-0.6	08-Dec-16	0.7	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0019	<0.0002	0.0012	<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
ES1628401016	GW04_6.0_6.1	GW04	6-6.1	08-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401004	GW05_1.6_1.7	GW05	1.6-1.7	08-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0036	0.0005	0.0021	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.0006	<0.0002
ES1628401006	GW05_3.4_3.5	GW05	3.4-3.5	08-Dec-16	<0.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281004	GW06_3.0-3.1	GW06	3-3.1	18-May-17	0.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281007	GW06_6.0-6.1	GW06	6-6.1	18-May-17	0.12	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281008	TQA01	GW06	6-6.1	18-May-17	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281014	GW07_3.0-3.1	GW07	3-3.1	18-May-17	0.12	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281017	GW07_5.0-5.1	GW07	5-5.1	18-May-17	0.03	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281022	GW08_2.0-2.1	GW08	2-2.1	18-May-17	0.12	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281025	GW08_5.0-5.1	GW08	5-5.1	18-May-17	0.03	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401083	SB11_1.0_1.1	SB11	1-1.1	07-Dec-16	<0.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401085	SB11_5.4-5.5	SB11	5.4-5.5	06-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401087	SB12_0.5_0.6	SB12	0.5-0.6	07-Dec-16	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ES1628401086	SB12_0.0_0.1	SB12	0-0.1	07-Dec-16	-	<0.0002	<0.0002	0.0005	<0.0005	<0.0005	<0.0002	*0.0163*	0.0032	0.0111	0.0021	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	0.0036	<0.001	<0.0002	<0.0002	0.0006	0.0071	<0.0002
S16-De13878	BD3_071216	SB12	0-0.1	07-Dec-16	-	-	<0.005	-	-	<0.005	-	-	<0.005	0.007[#1]	<0.005	<0.005	<0.01	-	<0.01	-	<0.01	<0.005	-	0.006	<0.005	<0.005	<0.005	0.008[#1]	<0.005
ES1628401091	SB12_5.6_5.7	SB12	5.6-5.7	07-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401093	SB13_0.5_0.6	SB13	0.5-0.6	07-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0068	<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
ES1628401095	SB13_2.0_2.1	SB13	2-2.1	07-Dec-16	<0.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401099	SB14_0.5_0.6	SB14	0.5-0.6	08-Dec-16	2.7	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	*0.0123*	0.0005	0.0103	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	0.0016	<0.001	<0.0002	<0.0002	<0.0002	0.0003	<0.0002
ES1628401102	SB14_3.0_3.1	SB14	3-3.1	08-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401106	SB15_0.5_0.6	SB15	0.5-0.6	08-Dec-16	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ES1628401107	SB15_1.0_1.1	SB15	1-1.1	08-Dec-16	-	<0.0002	<0.0002	0.0006	<0.0005	<0.0005	<0.0002	*0.029*	<0.0002	0.0116	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001	0.0006	<0.001	<0.0002	<0.0002	0.0004	0.0047	0.0008
ES1628401111	SB15_5.0_5.1	SB15	5-5.1	08-Dec-16	-	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Statistical Summary																														
Number of Results					20	38	39	38	38	39	38	38	39	39	39	39	39	38	39	38	39	39	38	39	39	39	39	39	39	39
Number of Detects					13	1	3	13	1	0	1	22	14	22	12	1	0	0	0	0	4	14	14	3	1	0	12	18	2
Minimum Concentration					0.03	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Appendix I
Table D
Soil Analytical Results - Combined

	TOC	PFAS																								
	Total Organic Carbon	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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
	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	0.02	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002
OEH/NSW Health 2017 Human Health Residential								*0.009*										*0.1*							
OEH/NSW Health 2017 Commercial / Industrial								**20**										**100**							
EC2017 Soil Indirect Ecological residential and parkland								22																	
EC2017 Ecological Soil indirect Commercial and industrial								90																	
CRC Care 2017 Tech Report 28 PFAS ESL Commercial & Industrial																		48[#1]							
CRC Care 2017 Tech Report 28 PFAS ESL Urban Residential and Public Open Space																		17[#4]							
SampleCode Field_ID Location_Code Sample_Depth (m) Sampled_Date																									
Minimum Detect	0.03	0.0004	0.0008	0.0003	0.0008	ND	0.0005	0.0005	0.0002	0.0002	0.0006	0.0028	ND	ND	ND	ND	0.0013	0.0002	0.0003	0.001	0.0015	ND	0.0002	0.0002	0.0002
Maximum Concentration	2.7	<0.0005	0.0218	0.104	0.0008	<0.005	0.0005	4.21	0.0172	0.164	0.0231	<0.005	<0.01	<0.0012	<0.01	<0.0012	0.0175	0.0671	0.0431	0.012	<0.005	<0.005	0.0136	0.127	<0.005
Maximum Detect	2.7	0.0004	0.0218	0.104	0.0008	ND	0.0005	4.21	0.0172	0.164	0.0231	0.0028	ND	ND	ND	ND	0.0175	0.0671	0.0431	0.012	0.0015	ND	0.0136	0.127	0.0008
Average Concentration	0.57	0.00011	0.00083	0.0052	0.00026	0.00031	0.00011	0.25	0.0019	0.019	0.0016	0.00037	0.00038	0.00026	0.00038	0.00026	0.00098	0.0047	0.0026	0.00095	0.0002	0.00017	0.0013	0.0072	0.00019
Median Concentration	0.25	0.0001	0.0001	0.0001	0.00025	0.00025	0.0001	0.00195	0.0001	0.0005	0.0001	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001
Standard Deviation	0.71	0.000054	0.0035	0.019	0.000089	0.00036	0.000069	0.9	0.0043	0.041	0.004	0.00054	0.00076	0.000057	0.00076	0.000057	0.0029	0.014	0.0073	0.002	0.00044	0.00038	0.003	0.021	0.0004
Number of Guideline Exceedances	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments
#1:60% species protection
#2:65% species protection
#3:99% species protection
#4:80% species protection
#5:85% species protection

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

Appendix I
Table D
Soil Analytical Results - Combined

	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
EQL	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002
OEH/NSW Health 2017 Human Health Residential							
OEH/NSW Health 2017 Commercial / Industrial							
EC2017 Soil Indirect Ecological residential and parkland	0.1						
EC2017 Ecological Soil indirect Commercial and industrial	0.14						
CRC Care 2017 Tech Report 28 PFAS ESL Commercial & Industrial	60[#2]						
CRC Care 2017 Tech Report 28 PFAS ESL Urban Residential and Public Open Space	32[#5]						
SampleCode **Field_ID** **Location_Code** **Sample_Depth (m)** **Sampled_Date**							
ON-SITE							
ES1628401033 GW01_0.0_0.2 GW01 0-0.2 06-Dec-16	0.0193	<0.0002	<0.0005	<0.0002	<0.0002	0.0491	0.0466
ES1628401038 GW01_4.0_4.1 GW01 4-4.1 06-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401026 GW02_0.5_0.6 GW02 0.5-0.6 06-Dec-16	0.0263	<0.0002	<0.0005	<0.0002	<0.0002	0.0688	0.0667
ES1628401031 GW02_5.0_5.1 GW02 5-5.1 06-Dec-16	0.0012	<0.0002	<0.0005	<0.0002	<0.0002	0.002	0.002
ES1628401041 SB06_0.5_0.6 SB06 0.5-0.6 06-Dec-16	3.57	0.0018	<0.0012	<0.0005	<0.0005	3.89	3.83
ES1628401043 SB06_2.0_2.1 SB06 2-2.1 06-Dec-16	-	-	-	-	-	-	-
ES1628401046 SB06_5.0_5.1 SB06 5-5.1 06-Dec-16	0.0226	<0.0002	<0.0005	<0.0002	<0.0002	0.162	0.148
ES1628401048 SB07_ASHPALT_0.0_0.3 SB07 0-0.3 05-Dec-16	0.0144	<0.0002	<0.0005	<0.0002	<0.0002	0.0151	0.0148
ES1628401050 SB07_0.5_0.6 SB07 0.5-0.6 05-Dec-16	0.0035	<0.0002	<0.0005	<0.0002	<0.0002	0.005	0.005
ES1628401053 SB07_3.0_3.1 SB07 3-3.1 05-Dec-16	0.0032	<0.0002	<0.0005	<0.0002	<0.0002	0.004	0.004
ES1628401058 SB08_0.5_0.6 SB08 0.5-0.6 05-Dec-16	0.124	<0.0002	<0.0005	<0.0002	<0.0002	0.152	0.146
ES1628401060 SB08_2.0_2.1 SB08 2-2.1 05-Dec-16	-	-	-	-	-	-	-
ES1628401063 SB08_5.0_5.1 SB08 5-5.1 05-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0241	0.0211
ES1628401066 SB09_0.5_0.6 SB09 0.5-0.6 05-Dec-16	-	-	-	-	-	-	-
ES1628401065 SB09_0.0_0.1 SB09 0-0.1 05-Dec-16	4.07	0.0068	<0.0005	<0.0002	0.0004	4.67	4.49
ES1628401070 SB09_4.0_4.1 SB09 4-4.1 06-Dec-16	0.0459	<0.0002	<0.0005	<0.0002	<0.0002	0.152	0.139
ES1628401073 SB10_0.0_0.1 SB10 0-0.1 06-Dec-16	0.0967	<0.0002	<0.0005	<0.0002	<0.0002	0.196	0.185
ES1628401077 SB10_2.3_2.5 SB10 2.3-2.5 06-Dec-16	0.0007	<0.0002	<0.0005	<0.0002	<0.0002	0.0015	0.0015
OFF-SITE							
ES1628401017 GW03_0.0_0.1 GW03 0-0.1 07-Dec-16	0.676	0.0005	<0.0005	<0.0002	<0.0002	0.937	0.907
ES1628401023 GW03_5.0_5.1 GW03 5-5.1 07-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.001	0.001
ES1628401010 GW04_0.5_0.6 GW04 0.5-0.6 08-Dec-16	0.0007	<0.0002	<0.0005	<0.0002	<0.0002	0.0019	0.0019
ES1628401016 GW04_6.0_6.1 GW04 6-6.1 08-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401004 GW05_1.6_1.7 GW05 1.6-1.7 08-Dec-16	0.0015	<0.0002	<0.0005	<0.0002	<0.0002	0.0053	0.005
ES1628401006 GW05_3.4_3.5 GW05 3.4-3.5 08-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281004 GW06_3.0-3.1 GW06 3-3.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281007 GW06_6.0-6.1 GW06 6-6.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281008 TQA01 GW06 6-6.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281014 GW07_3.0-3.1 GW07 3-3.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281017 GW07_5.0-5.1 GW07 5-5.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281022 GW08_2.0-2.1 GW08 2-2.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712281025 GW08_5.0-5.1 GW08 5-5.1 18-May-17	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401083 SB11_1.0_1.1 SB11 1-1.1 07-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401085 SB11_5.4-5.5 SB11 5.4-5.5 06-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401087 SB12_0.5_0.6 SB12 0.5-0.6 07-Dec-16	-	-	-	-	-	-	-
ES1628401086 SB12_0.0_0.1 SB12 0-0.1 07-Dec-16	0.0052	<0.0002	<0.0005	<0.0002	<0.0002	0.0338	0.0297
S16-De13878 BD3_071216 SB12 0-0.1 07-Dec-16	0.009[#1]	<0.01	<0.005	<0.005	<0.005	-	-
ES1628401091 SB12_5.6_5.7 SB12 5.6-5.7 07-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401093 SB13_0.5_0.6 SB13 0.5-0.6 07-Dec-16	0.0066	<0.0002	<0.0005	<0.0002	<0.0002	0.0068	0.0068
ES1628401095 SB13_2.0_2.1 SB13 2-2.1 07-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401099 SB14_0.5_0.6 SB14 0.5-0.6 08-Dec-16	0.002	<0.0002	<0.0005	<0.0002	<0.0002	0.0147	0.0131
ES1628401102 SB14_3.0_3.1 SB14 3-3.1 08-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1628401106 SB15_0.5_0.6 SB15 0.5-0.6 08-Dec-16	-	-	-	-	-	-	-
ES1628401107 SB15_1.0_1.1 SB15 1-1.1 08-Dec-16	0.0174	<0.0002	<0.0005	<0.0002	<0.0002	0.0377	0.0357
ES1628401111 SB15_5.0_5.1 SB15 5-5.1 08-Dec-16	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Statistical Summary							
Number of Results	39	39	39	39	39	38	38
Number of Detects	21	3	0	0	1	22	22
Minimum Concentration	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002

Appendix I
Table D
Soil Analytical Results - Combined

	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
EQL	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002
OEH/NSW Health 2017 Human Health Residential							
OEH/NSW Health 2017 Commercial / Industrial							
EC2017 Soil Indirect Ecological residential and parkland	0.1						
EC2017 Ecological Soil indirect Commercial and industrial	0.14						
CRC Care 2017 Tech Report 28 PFAS ESL Commercial & Industrial	60[#2]						
CRC Care 2017 Tech Report 28 PFAS ESL Urban Residential and Public Open Space	32[#5]						
SampleCode Field_ID Location_Code Sample_Depth (m) Sampled_Date							
Minimum Detect	0.0007	0.0005	ND	ND	0.0004	0.001	0.001
Maximum Concentration	4.07	<0.01	<0.005	<0.005	<0.005	4.67	4.49
Maximum Detect	4.07	0.0068	ND	ND	0.0004	4.67	4.49
Average Concentration	0.22	0.00045	0.00032	0.00017	0.00017	0.27	0.27
Median Concentration	0.0007	0.0001	0.00025	0.0001	0.0001	0.00195	0.00195
Standard Deviation	0.86	0.0013	0.00036	0.00038	0.00039	0.97	0.95
Number of Guideline Exceedances	4	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	4	0	0	0	0	0	0

Env Stds Comments
#1:60% species protection
#2:65% species protection
#3:99% species protection
#4:80% species protection
#5:85% species protection

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

Appendix I
Table E
Sediment Analytical Results - Combined

				TOC	PFAS																																
				Total Organic Carbon	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.02	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002
SampleCode	**Field_ID**	**Location_Code**	**Sampled_Date_Time**																																		
ES1629123001	SS01	SS01	16/12/2016	0.6	-	-	-	<0.0005	<0.0005	-	0.0049	<0.0002	0.0002	<0.0002	<0.0005	-	-	-	-	<0.0005	<0.0002	-	<0.001	-	-	<0.0002	<0.0002	-	0.0047	-	-	-	-	-	0.0049
ES1712870013	SS01	SS01	25/05/2017	3.85	<0.0002	0.0014	0.0002	<0.0005	<0.0005	<0.0002	0.0409	<0.0002	0.0016	<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	0.0005	<0.0002	0.0393	0.0007	<0.0005	<0.0002	<0.0002	0.0441	0.0416
ES1629123002	SS02	SS02	16/12/2016	4	-	-	-	<0.0005	<0.0005	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	-	-	-	-	<0.0005	<0.0002	-	<0.001	-	-	<0.0002	<0.0002	-	<0.0002	-	-	-	-	-	<0.0002
ES1712870024	SS02	SS02	25/05/2017	0.42	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1629123003	SS03	SS03	16/12/2016	12.1	-	-	-	<0.0005	<0.0005	-	0.115	<0.0002	0.0027	0.0004	<0.0005	-	-	-	-	0.0008	0.0006	-	<0.001	-	-	<0.0002	<0.0002	-	0.112	-	-	-	-	-	0.116
ES1712870025	SS03	SS03	25/05/2017	13.3	<0.0002	<0.0002	0.0015	<0.0005	<0.0005	<0.0002	0.0985	0.0012	0.0142	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	0.002	<0.001	<0.0002	<0.0002	0.0008	0.003	0.0002	0.0843	<0.0002	<0.0005	<0.0002	<0.0002	0.109	0.105
ES1629123004	SS04	SS04	16/12/2016	1.8	-	-	-	<0.0005	<0.0005	-	0.0015	<0.0002	<0.0002	<0.0002	<0.0005	-	-	-	-	<0.0005	<0.0002	-	<0.001	-	-	<0.0002	<0.0002	-	0.0015	-	-	-	-	-	0.0015
ES1712870026	SS04	SS04	25/05/2017	0.14	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0007	<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	0.0007	<0.0002	<0.0005	<0.0002	<0.0002	0.0007	0.0007
ES1629123005	SS05	SS05	16/12/2016	0.7	-	-	-	<0.0005	<0.0005	-	0.0757	0.0005	0.0039	0.0014	<0.0005	-	-	-	-	0.0007	0.0024	-	<0.001	-	-	0.0007	0.0031	-	0.0718	-	-	-	-	-	0.0845
ES1629123006	SSQA2	SS05	16/12/2016	0.6	-	-	-	0.0006	<0.0005	-	0.197	0.0008	0.0108	0.0019	<0.0005	-	-	-	-	0.0019	0.0051	-	<0.001	-	-	0.0012	0.0045	-	0.186	-	-	-	-	-	0.212
ES1712870014	SS05	SS05	25/05/2017	0.33	0.0003	0.008	0.0005	<0.0005	<0.0005	0.0006	0.267	0.0003	0.0039	<0.0002	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	0.0004	<0.001	<0.0002	<0.0002	0.0003	0.0029	<0.0002	0.263	0.0118	<0.0005	<0.0002	<0.0002	0.294	0.273
ES1712870016	TQA06	SS05	25/05/2017	-	<0.0002	0.0044	0.0003	<0.0005	<0.0005	0.0004	0.103	0.0002	0.0022	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	0.0003	<0.001	<0.0002	<0.0002	<0.0002	0.002	<0.0002	0.101	0.0031	<0.0005	<0.0002	<0.0002	0.115	0.106
ES1712870027	SS06	SS06	25/05/2017	0.88	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
ES1712870028	SS07	SS07	25/05/2017	2.92	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.001	<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	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.001	0.001
ES1712870015	SS08	SS08	25/05/2017	2.62	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.005	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	0.005	<0.0002	<0.0005	<0.0002	<0.0002	0.0053	0.005
ES1712870029	SS09	SS09	25/05/2017	0.3	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0202	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0006	0.0002	<0.0002	<0.0002	<0.0002	0.0202	<0.0002	<0.0005	<0.0002	<0.0002	0.021	0.0202
Statistical Summary																																					
Number of Results				15	10	10	10	16	16	10	16	16	16	16	16	10	10	10	10	16	16	10	16	10	10	16	16	10	16	10	10	10	10	10	16
Number of Detects				15	1	3	4	1	0	2	13	5	8	3	1	0	0	0	0	3	7	4	0	2	1	4	6	1	13	3	0	0	0	8	13
Minimum Concentration				0.14	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Minimum Detect				0.14	0.0003	0.0014	0.0002	0.0006	ND	0.0004	0.0007	0.0002	0.0002	0.0004	0.0008	ND	ND	ND	ND	0.0007	0.0002	0.0002	ND	0.0003	0.0002	0.0003	0.0005	0.0002	0.0007	0.0007	ND	ND	ND	0.0007	0.0007
Maximum Concentration				13.3	0.0003	0.008	0.0015	0.0006	<0.0005	0.0006	0.267	0.0012	0.0142	0.0019	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	0.0019	0.0051	0.002	<0.001	0.0006	0.0002	0.0012	0.0045	0.0002	0.263	0.0118	<0.0005	<0.0002	<0.0002	0.294	0.273
Maximum Detect				13.3	0.0003	0.008	0.0015	0.0006	ND	0.0006	0.267	0.0012	0.0142	0.0019	0.0008	ND	ND	ND	ND	0.0019	0.0051	0.002	ND	0.0006	0.0002	0.0012	0.0045	0.0002	0.263	0.0118	ND	ND	ND	0.294	0.273
Average Concentration				3	0.00012	0.0015	0.00031	0.00027	0.00025	0.00018	0.058	0.00026	0.0025	0.00031	0.00028	0.00025	0.00025	0.00025	0.00025	0.00042	0.00083	0.00035	0.0005	0.00017	0.00011	0.00026	0.0011	0.00011	0.056	0.0016	0.00025	0.0001	0.0001	0.059	0.061
Median Concentration				0.88	0.0001	0.0001	0.0001	0.00025	0.00025	0.0001	0.0126	0.0001	0.00015	0.0001	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0126	0.0001	0.00025	0.0001	0.0001	0.01315	0.0126
Standard Deviation				4.2	0.000063	0.0027	0.00044	0.000088	0	0.00018	0.081	0.00032	0.0042	0.00054	0.00014	0	0	0	0	0.00043	0.0013	0.00059	0	0.00016	0.000032	0.00033	0.0015	0.000032	0.078	0.0037	0	0	0	0.094	0.084
Number of Guideline Exceedances				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

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

Appendix I
Table F
ASLP Leachate Analytical Results - Combined

																			PFAS															
								N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
								µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL								0.02	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01
SampleCode	**Field_ID**	**Location_Code**	**Sample_Depth_F**	**Sampled_Date_Time**	**Matrix**																																	
ES1700845001	GW01_0.0-0.2	GW01	0-0.2	6/12/2016	ASLP	<0.02	<0.02	0.06	<0.05	<0.05	<0.02	1.37	0.05	0.49	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.05	<0.1	<0.02	<0.02	0.02	0.16	<0.02	0.88	<0.02	<0.05	<0.02	<0.02	1.82	1.71
ES1700845002	GW02_0.5-0.6	GW02	0.5-0.6	6/12/2016	ASLP	<0.02	<0.02	0.04	<0.05	<0.05	<0.02	2.55	0.14	1.17	0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.09	<0.1	<0.02	<0.02	<0.02	0.14	<0.02	1.38	<0.02	<0.05	<0.02	<0.02	3.04	2.91
ES1700845003	GW03_0.0-0.1	GW03	0-0.1	7/12/2016	ASLP	<0.02	<0.02	1.47	<0.05	<0.05	<0.02	76.9	0.75	9.52	0.36	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.39	0.86	<0.1	<0.02	<0.02	0.42	1.92	<0.02	67.4	<0.02	<0.05	<0.02	<0.02	84.1	81.8
ES1700845004	GW04_0.5-0.6	GW04	0.5-0.6	8/12/2016	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.49	<0.02	0.06	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.43	<0.02	<0.05	<0.02	<0.02	0.49	0.49
ES1700845005	GW05_1.6-1.7	GW05	1.6-1.7	8/12/2016	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.21	<0.02	0.06	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	0.03	<0.02	0.15	<0.02	<0.05	<0.02	<0.02	0.24	0.24
ES1712281007	GW06_6.0-6.1	GW06	6-6.1	18/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	6.93	<0.02	0.07	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	6.86	<0.02	<0.05	<0.02	<0.02	6.93	6.93
ES1712281017	GW07_5.0-5.1	GW07	5-5.1	18/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.54	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.54	<0.02	<0.05	<0.02	<0.02	0.54	0.54
ES1700845006	SB06_0.5-0.6	SB06	0.5-0.6	6/12/2016	ASLP	<0.02	0.03	2.49	<0.05	<0.05	<0.02	192	0.48	8.53	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	1.81	0.42	<0.1	0.02	<0.02	0.24	1.13	<0.02	183	0.02	<0.05	<0.02	<0.02	198	196
ES1700845007	SB06_5.0-5.1	SB06	5-5.1	6/12/2016	ASLP	<0.02	<0.02	0.2	<0.05	<0.05	<0.02	10.8	1.03	9.67	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23	0.7	<0.1	<0.02	<0.02	0.12	1.31	<0.02	1.15	<0.02	<0.05	<0.02	<0.02	14.6	13.7
ES1700845008	SB07_3.0-3.1	SB07	3-3.1	5/12/2016	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.75	<0.02	0.04	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	0.71	<0.02	<0.05	<0.02	<0.02	0.77	0.77
ES1700845009	SB08_0.5-0.6	SB08	0.5-0.6	5/12/2016	ASLP	<0.02	<0.02	0.55	<0.05	<0.05	<0.02	21.5	0.15	1.96	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23	0.14	<0.1	<0.02	<0.02	0.04	0.18	<0.02	19.5	<0.02	<0.05	<0.02	<0.02	22.8	22.1
ES1700845010	SB09_0.0-0.1	SB09	0-0.1	5/12/2016	ASLP	<0.02	0.29	6.58	<0.05	<0.05	<0.02	550	1.93	26	0.69	0.18	<0.05	<0.05	<0.05	<0.05	1.35	3.13	1.89	<0.1	0.07	<0.02	0.37	2.77	<0.02	524	1.27	<0.05	<0.02	<0.02	570	560
ES1700845011	SB09_4.0-4.1	SB09	4-4.1	6/12/2016	ASLP	<0.02	<0.02	0.41	<0.05	<0.05	<0.02	10.7	0.97	4.78	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.38	0.73	<0.1	<0.02	<0.02	0.23	1.59	<0.02	5.88	<0.02	<0.05	<0.02	<0.02	15.2	14.1
ES1700845012	SB10_0.0-0.1	SB10	0-0.1	6/12/2016	ASLP	<0.02	<0.02	0.32	<0.05	<0.05	<0.02	11.5	0.09	2.63	0.35	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.37	0.12	<0.1	<0.02	<0.02	0.19	0.65	<0.02	8.84	0.05	<0.05	<0.02	<0.02	13.6	13.1
ES1700845013	SB12_0.0-0.1	SB12	0-0.1	7/12/2016	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.44	0.32	0.37	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.1	<0.1	<0.02	<0.02	<0.02	0.15	<0.02	0.07	<0.02	<0.05	<0.02	<0.02	1.07	0.97
ES1700845014	SB13_0.5-0.6	SB13	0.5-0.6	7/12/2016	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.17	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.17	<0.02	<0.05	<0.02	<0.02	0.17	0.17
ES1700845015	SB14_0.5-0.6	SB14	0.5-0.6	8/12/2016	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.59	0.02	0.45	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.04	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	0.14	<0.02	<0.05	<0.02	<0.02	0.67	0.63
ES1700845016	SB15_1.0-1.1	SB15	1-1.1	8/12/2016	ASLP	<0.02	<0.02	0.08	<0.05	<0.05	<0.02	2.71	0.03	1.18	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.06	<0.1	<0.02	<0.02	0.03	0.22	0.05	1.53	<0.02	<0.05	<0.02	<0.02	3.29	3.1
ES1712870013	SS01	SS01		25/05/2017	ASLP	<0.02	0.02	<0.02	<0.05	<0.05	<0.02	2.94	<0.02	0.1	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	2.84	<0.02	<0.05	<0.02	<0.02	2.97	2.95
ES1712870024	SS02	SS02		25/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
ES1712870025	SS03	SS03		25/05/2017	ASLP	<0.02	<0.02	0.02	<0.05	<0.05	<0.02	1.13	0.05	0.3	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.04	0.7	<0.02	<0.02	0.02	0.07	<0.02	0.83	<0.02	<0.05	<0.02	<0.02	2.06	2
ES1712870026	SS04	SS04		25/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	0.03	0.03
ES1712870014	SS05	SS05		25/05/2017	ASLP	<0.02	0.35	0.02	<0.05	<0.05	<0.02	12.3	0.07	0.34	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	0.04	<0.1	<0.02	<0.02	0.03	0.39	<0.02	12	0.25	<0.05	<0.02	<0.02	13.7	13
ES1712870027	SS06	SS06		25/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.05	<0.02	<0.02	0.01	0.01
ES1712870028	SS07	SS07		25/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	0.03	0.03
ES1712870015	SS08	SS08		25/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.11	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.11	<0.02	<0.05	<0.02	<0.02	0.11	0.11
ES1712870029	SS09	SS09		25/05/2017	ASLP	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.48	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.48	<0.02	<0.05	<0.02	<0.02	0.48	0.48

Statistical Summary

Number of Results	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Number of Detects	0	4	12	0	0	0	26	14	19	12	1	0	0	0	0	2	13	14	1	2	0	11	16	1	26	4	0	0	0	26	26		
Minimum Concentration	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01		
Minimum Detect	ND	0.02	0.02	ND	ND	ND	0.01	0.02	0.04	0.03	0.18	ND	ND	ND	ND	0.08	0.01	0.04	0.7	0.02	ND	0.02	0.02	0.05	0.01	0.02	ND	ND	ND	0.01	0.01		
Maximum Concentration	<0.02	0.35	6.58	<0.05	<0.05	<0.02	550	1.93	26	0.69	0.18	<0.05	<0.05	<0.05	<0.05	1.35	3.13	1.89	0.7	0.07	<0.02	0.42	2.77	0.05	524	1.27	<0.05	<0.02	<0.02	570	560		
Maximum Detect	ND	0.35	6.58	ND	ND	ND	550	1.93	26	0.69	0.18	ND	ND	ND	ND	1.35	3.13	1.89	0.7	0.07	ND	0.42	2.77	0.05	524	1.27	ND	ND	ND	570	560		
Average Concentration	0.01	0.034	0.46	0.025	0.025	0.01	34	0.23	2.5	0.096	0.031	0.025	0.025	0.025	0.025	0.076	0.29	0.2	0.074	0.013	0.01	0.069	0.4	0.011	31	0.067	0.025	0.01	0.01	35	35		
Median Concentration	0.01	0.01	0.01	0.025	0.025	0.01	1.13	0.02	0.3	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.005	0.04	0.05	0.01	0.01	0.01	0.03	0.01	0.83	0.01	0.025	0.01	0.01	1.82	1.71		
Standard Deviation	0	0.083	1.3	0	0	0	110	0.45	5.5	0.16	0.03	0	0	0	0	0.25	0.71	0.42	0.13	0.012	0	0.12	0.71	0.0077	105	0.24	0	0	0	114	112		
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Env Stds Comments

Appendix I
Table G
Groundwater and Surface Water Analytical Results - Combined

SampleCode	Field_ID	Location_Code	Sampled_Date_Time	Field Parameters								
				Purge Volume	Purge SWL (mbTOC) (Field)	DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)	Total Suspended Solids
				L	mbTOC	mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L
EQL											10	5
Commonwealth (Draft) Env. Mgmt. Guidance on PFOS and PFOA - FW & MW 95%												
FSANZ - PFAS Drinking water quality guideline												
FSANZ - PFAS Recreational water quality guideline												
ES1701791007	GW01	GW01	16/12/2016	-	3.296	6.24	10,004	6.04	73.6	18.4	8140	-
ES1701791007R1	GW01	GW01	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791007R2	GW01	GW01	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791012	GWQA3	GW01	16/12/2016	-	-	-	-	-	-	-	7780	-
ES1712870001	GW01	GW01	25/05/2017	7	-	2.75	5238	6.83	118.6	19.8	4430	-
ES1701791008	GW02	GW02	16/12/2016	-	3.35	3.02	15,320	4.37	217.9	19.2	12,000	-
ES1712870002	GW02	GW02	25/05/2017	7	-	0.23	4464	10.19	24.7	19.4	2980	-
ES1712870009	TQA04	GW02	25/05/2017	-	-	-	-	-	-	-	-	394
ES1701791009	GW03	GW03	16/12/2016	-	3.14	1.81	11,706	4.72	128	18.3	11,100	-
ES1701791009R1	GW03	GW03	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791009R2	GW03	GW03	16/12/2016	-	-	-	-	-	-	-	-	-
ES1712870003	GW03	GW03	25/05/2017	9	-	2.13	4889	5.24	163.1	18.7	3220	-
ES1701791010	GW04	GW04	16/12/2016	-	2.61	3.32	16,983	3.75	283.5	18.5	16,800	-
ES1712870004	GW04	GW04	25/05/2017	8	-	2.47	5445	5.19	235.1	19.2	4530	-
ES1701791011	GW05	GW05	16/12/2016	-	2.815	3.05	11,069	4.39	165.9	18.7	8220	-
ES1712870005	GW05	GW05	25/05/2017	6	-	2.62	10,089	3.96	244.4	19.4	6210	-
ES1712870006	GW06	GW06	25/05/2017	6	-	1.29	2368	4.55	189.4	19.9	1840	-
ES1712870007	GW07	GW07	25/05/2017	6	-	1.71	9960	3.82	335.2	19.2	6400	-
ES1712870008	GW08	GW08	25/05/2017	6	-	2.87	6090	4.54	416.1	18.3	4610	-
ES1701791001	SW01	SW01	16/12/2016	-	-	4.43	84.6	8.07	52.9	19.7	101	-
ES1701791001R1	SW01	SW01	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791001R2	SW01	SW01	16/12/2016	-	-	-	-	-	-	-	-	-
ES1712870010	SW01	SW01	25/05/2017	-	-	3.44	334.4	5.78	229.7	12.8	-	-
ES1701791002	SW02	SW02	16/12/2016	-	-	5.11	199.8	7.25	59.6	21.5	165	-
ES1712870018	SW02	SW02	25/05/2017	-	-	5.34	664	7.85	234.5	13.2	-	7
ES1701791003	SW03	SW03	16/12/2016	-	-	4.15	96.9	7.28	77.2	18.8	107	-
ES1701791003R1	SW03	SW03	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791003R2	SW03	SW03	16/12/2016	-	-	-	-	-	-	-	-	-
ES1712870019	SW03	SW03	25/05/2017	-	-	0.98	352.8	7.31	143.8	11.5	-	408
ES1701791004	SW04	SW04	16/12/2016	-	-	5.17	4515	8.31	77.9	19.6	3440	-
ES1712870020	SW04	SW04	25/05/2017	-	-	3.8	39,258	7.36	291.2	14.6	-	<5
ES1701791005	SW05	SW05	16/12/2016	-	-	3.74	162.9	7.32	71.6	18.5	151	-
ES1701791005R1	SW05	SW05	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791005R2	SW05	SW05	16/12/2016	-	-	-	-	-	-	-	-	-
ES1701791006	SWQA1	SW05	16/12/2016	-	-	-	-	-	-	-	137	-
S17-My28782	TQA05	SW05	25/05/2017	-	-	-	-	-	-	-	-	-
ES1712870011	SW05	SW05	25/05/2017	-	-	5.32	136.6	7.56	174.3	14.5	-	12
ES1712870021	SW06	SW06	25/05/2017	-	-	12.35	1228	8.71	215.2	9.2	-	26
ES1712870022	SW07	SW07	25/05/2017	-	-	0.15	350.8	7.06	210.1	12.5	-	10,600
ES1712870012	SW08	SW08	25/05/2017	-	-	5.02	43,275	6.98	323.3	19	-	706
ES1712870023	SW09	SW09	25/05/2017	-	-	6.38	38,631	7.6	300.7	13.8	-	14

SampleCode	PFAS													
	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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
	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	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05
Commonwealth (Draft) Env. Mgmt. Guidance on PFOS and PFOA - FW & MW 95%														
FSANZ - PFAS Drinking water quality guideline							**0.07**							
FSANZ - PFAS Recreational water quality guideline							0.7							
ES1701791007	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.45**	<0.1	0.22	<0.1	<0.25	<0.25	<0.25	<0.25
ES1701791007R1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.41**	<0.1	0.3	<0.1	<0.25	<0.25	<0.25	<0.25
ES1701791007R2	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.38**	<0.1	0.27	<0.1	<0.25	<0.25	<0.25	<0.25
ES1701791012	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.57**	<0.1	0.34	<0.1	<0.25	<0.25	<0.25	<0.25
ES1712870001	<0.02	<0.02	0.08	<0.05	<0.05	<0.02	**1.45**	0.26	1.1	<0.02	<0.05	<0.05	<0.05	<0.05
ES1701791008	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.25	<0.25	<0.25	<0.25
ES1712870002	<0.02	<0.02	0.21	<0.05	<0.05	<0.02	**19**	2.76	15.4	0.18	<0.05	<0.05	<0.05	<0.05
ES1712870009	<0.02	<0.02	0.22	<0.05	<0.05	<0.02	**19.7**	2.73	16	0.18	<0.05	<0.05	<0.05	<0.05
ES1701791009	<0.1	<0.1	1.14	<0.25	<0.25	<0.1	**46.5**	12.8	38.2	2.96	<0.25	<0.25	<0.25	<0.25
ES1701791009R1	<0.1	<0.1	1.14	<0.25	<0.25	<0.1	**28.7**	8.28	24.9	2.49	<0.25	<0.25	<0.25	<0.25
ES1701791009R2	<0.1	<0.1	1.14	<0.25	<0.25	<0.1	**29.4**	8.26	25.5	2.5	<0.25	<0.25	<0.25	<0.25
ES1712870003	<0.02	<0.02	6.31	<0.05	<0.05	<0.02	**220**	47	200	11.4	<0.05	<0.05	<0.05	<0.05
ES1701791010	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.25	<0.25	<0.25	<0.25
ES1712870004	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**0.11**	0.03	0.08	<0.02	<0.05	<0.05	<0.05	<0.05
ES1701791011	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	**0.1**	0.12	<0.1	<0.1	<0.25	<0.25	<0.25	<0.25
ES1712870005	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.06	0.05	0.04	<0.02	<0.05	<0.05	0.51	<0.05
ES1712870006	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870007	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870008	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1701791001	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**2.02**	0.04	0.34	0.06	<0.05	<0.05	<0.05	<0.05
ES1701791001R1	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**1.46**	0.032	0.28	0.05	<0.05	<0.05	<0.05	<0.05
ES1701791001R2	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**1.4**	0.032	0.28	0.04	<0.05	<0.05	<0.05	<0.05
ES1712870010	<0.02	<0.02	0.05	<0.05	<0.05	<0.02	**2.45**	0.16	0.82	<0.02	<0.05	<0.05	<0.05	<0.05
ES1701791002	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**0.08**	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870018	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1701791003	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**1.35**	0.03	0.21	0.05	<0.05	<0.05	<0.05	<0.05
ES1701791003R1	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**0.96**	0.026	0.18	0.03	<0.05	<0.05	<0.05	<0.05
ES1701791003R2	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**0.91**	0.024	0.18	0.03	<0.05	<0.05	<0.05	<0.05
ES1712870019	<0.02	<0.02	0.03	<0.05	<0.05	<0.02	**1.27**	0.07	0.36	<0.02	<0.05	<0.05	0.05	<0.05
ES1701791004	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**0.24**	<0.02	0.05	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870020	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1701791005	<0.02	1.15	1.44	<0.05	<0.05	0.06	**162**	3.85	27.2	4.78	0.4	<0.05	<0.05	<0.05
ES1701791005R1	<0.02	1.15	1.44	<0.05	<0.05	0.06	**124**	2.86	20	4.34	0.5	<0.05	<0.05	<0.05
ES1701791005R2	<0.02	1.15	1.44	<0.05	<0.05	0.06	**129**	2.78	19.6	4.26	0.5	<0.05	<0.05	<0.05
ES1701791006	<0.02	1.13	1.48	<0.05	<0.05	0.08	**159**	3.77	26.2	4.69	0.42	<0.05	<0.05	<0.05
S17-My28782	<0.05	0.34$^{\#1}$	0.78$^{\#1}$	<0.01	<0.01	<0.05	-	1.5	9.2$^{\#1}$	1.9	0.06	<0.05	<0.05	<0.05
ES1712870011	<0.02	0.11	0.74	<0.05	<0.05	<0.02	**44.1**	1.74	11.3	0.88	0.09	<0.05	<0.05	<0.05
ES1712870021	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	**0.15**	<0.02	0.09	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870022	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870012	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
ES1712870023	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05

SampleCode	PFAS													
	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
	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	0.05	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
Commonwealth (Draft) Env. Mgmt. Guidance on PFOS and PFOA - FW & MW 95%			*220*								*0.13*			
FSANZ - PFAS Drinking water quality guideline			**0.56**											
FSANZ - PFAS Recreational water quality guideline			5.6											
ES1701791007	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	0.12	<0.1	*0.23*	<0.1	<0.25	<0.1
ES1701791007R1	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	0.15	<0.1	0.11	<0.1	<0.25	<0.1
ES1701791007R2	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	0.15	<0.1	0.11	<0.1	<0.25	<0.1
ES1701791012	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	0.14	<0.1	*0.23*	<0.1	<0.25	<0.1
ES1712870001	<0.05	<0.05	0.03	0.21	<0.1	<0.02	<0.02	<0.02	0.13	<0.02	*0.35*	<0.02	<0.05	<0.02
ES1701791008	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	*0.2*	<0.1	<0.25	<0.1
ES1712870002	<0.05	<0.05	0.13	2.37	<0.1	<0.02	<0.02	0.07	0.69	<0.02	*3.56*	<0.02	<0.05	<0.02
ES1712870009	<0.05	<0.05	0.13	2.38	<0.1	<0.02	<0.02	0.08	0.64	<0.02	*3.66*	<0.02	<0.05	<0.02
ES1701791009	<0.25	<0.25	**2.57**	9.22	<0.5	<0.1	<0.1	3.01	14.8	<0.1	*8.26*	<0.1	<0.25	<0.1
ES1701791009R1	<0.25	<0.25	**1.64**	8.33	<0.5	<0.1	<0.1	1.9	13.1	<0.1	*3.82*	<0.1	<0.25	<0.1
ES1701791009R2	<0.25	<0.25	**1.66**	8.3	<0.5	<0.1	<0.1	1.94	13.2	<0.1	*3.94*	<0.1	<0.25	<0.1
ES1712870003	<0.05	2.52	**7.21**	44	5.2	<0.02	<0.02	4.85	50	<0.02	*20*	<0.02	<0.05	<0.02
ES1701791010	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	*0.2*	<0.1	<0.25	<0.1
ES1712870004	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02
ES1701791011	<0.25	<0.25	<0.05	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.25	<0.1
ES1712870005	<0.05	<0.05	<0.01	0.03	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.02
ES1712870006	<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
ES1712870007	<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
ES1712870008	<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
ES1701791001	<0.05	<0.05	0.03	0.04	<0.1	<0.02	<0.02	0.02	0.08	<0.02	*1.68*	<0.02	<0.05	<0.02
ES1701791001R1	<0.05	<0.05	0.03	0.04	<0.1	<0.02	<0.02	0.02	0.07	<0.02	*1.18*	<0.02	<0.05	<0.02
ES1701791001R2	<0.05	<0.05	0.03	0.04	<0.1	<0.02	<0.02	0.02	0.07	<0.02	*1.12*	<0.02	<0.05	<0.02
ES1712870010	<0.05	<0.05	0.04	0.15	<0.1	<0.02	<0.02	0.02	0.14	<0.02	*1.63*	<0.02	<0.05	<0.02
ES1701791002	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.05	<0.02
ES1712870018	<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
ES1701791003	<0.05	<0.05	0.04	0.03	<0.1	<0.02	<0.02	<0.02	0.05	<0.02	*1.14*	<0.02	<0.05	<0.02
ES1701791003R1	<0.05	<0.05	0.03	0.03	<0.1	<0.02	<0.02	<0.02	0.05	<0.02	*0.78*	<0.02	<0.05	<0.02
ES1701791003R2	<0.05	<0.05	0.03	0.03	<0.1	<0.02	<0.02	<0.02	0.05	<0.02	*0.73*	<0.02	<0.05	<0.02
ES1712870019	<0.05	<0.05	0.02	0.06	<0.1	<0.02	<0.02	<0.02	0.05	<0.02	*0.91*	<0.02	<0.05	<0.02
ES1701791004	<0.05	<0.05	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	*0.19*	<0.02	<0.05	<0.02
ES1712870020	<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
ES1701791005	<0.05	3.64	**9.13**	3.5	<0.1	0.08	<0.02	2.93	18.5	0.13	*135*	1.01	<0.05	<0.02
ES1701791005R1	<0.05	2	**6.28**	3.4	<0.1	0.08	<0.02	2.17	13.9	0.15	*104*	0.97	<0.05	<0.02
ES1701791005R2	<0.05	2.28	**6.43**	3.2	<0.1	0.09	<0.02	2.35	13.5	0.14	*109*	0.9	<0.05	<0.02
ES1701791006	<0.05	3.33	**8.55**	3.46	<0.1	0.08	<0.02	2.87	18.3	0.1	*133*	1.05	<0.05	<0.02
S17-My28782	<0.05	0.51	**2.3$^{\#1}$**	1.4$^{\#1}$	0.99	0.02$^{\#1}$	<0.01$^{\#1}$	0.88$^{\#1}$	6.7$^{\#1}$	0.07$^{\#1}$	*44$^{\#1}$*	0.2	<0.01	<0.01
ES1712870011	<0.05	1.3	**1.86**	1.74	0.8	<0.02	<0.02	0.65	4.36	0.04	*32.8*	0.24	<0.05	<0.02
ES1712870021	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.02
ES1712870022	<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
ES1712870012	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.02
ES1712870023	<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

Statistical Summary

	Purge Volume	Purge SWL (mbTOC) (Field)	DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)	Total Suspended Solids
Number of Results	8	5	27	27	27	27	27	20	9
Number of Detects	8	5	27	27	27	27	27	20	8
Minimum Concentration	6	2.61	0.15	84.6	3.75	24.7	9.2	101	<5
Minimum Detect	6	2.61	0.15	84.6	3.75	24.7	9.2	101	7
Maximum Concentration	9	3.35	12.35	43275	10.19	416.1	21.5	16800	10600
Maximum Detect	9	3.35	12.35	43275	10.19	416.1	21.5	16800	10600
Average Concentration	6.9	3	3.7	8997	6.4	187	17	5118	1352
Median Concentration	6.5	3.14	3.32	4889	6.98	189.4	18.7	4480	26
Standard Deviation	1.1	0.32	2.4	12358	1.7	100	3.2	4562	3477
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0

	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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
Number of Results	41	41	41	41	41	41	40	41	41	41	41	41	41	41
Number of Detects	0	6	15	0	0	4	33	24	29	18	6	0	2	0
Minimum Concentration	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Minimum Detect	ND	0.11	0.03	ND	ND	0.06	0.06	0.024	0.04	0.03	0.06	ND	0.05	ND
Maximum Concentration	<0.1	1.15	6.31	<0.25	<0.25	<0.1	220	47	200	11.4	0.5	<0.25	0.51	<0.25
Maximum Detect	ND	1.15	6.31	ND	ND	0.08	220	47	200	11.4	0.5	ND	0.51	ND
Average Concentration	0.02	0.14	0.44	0.049	0.049	0.025	25	2.4	11	1	0.094	0.049	0.062	0.049
Median Concentration	0.01	0.01	0.05	0.025	0.025	0.01	0.74	0.05	0.27	0.05	0.025	0.025	0.025	0.025
Standard Deviation	0.017	0.34	1.1	0.044	0.044	0.022	54	7.6	32	2.2	0.13	0.043	0.084	0.043
Number of Guideline Exceedances	0	0	0	0	0	0	31	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	31	0	0	0	0	0	0	0

	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
Number of Results	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Number of Detects	0	7	22	22	3	5	0	16	25	6	34	6	0	0
Minimum Concentration	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.01	<0.01
Minimum Detect	ND	0.51	0.01	0.03	0.8	0.02	ND	0.02	0.05	0.04	0.02	0.2	ND	ND
Maximum Concentration	<0.25	3.64	9.13	44	5.2	<0.1	<0.1	4.85	50	0.15	135	1.05	<0.25	<0.1
Maximum Detect	ND	3.64	9.13	44	5.2	0.09	ND	4.85	50	0.15	135	1.05	ND	ND
Average Concentration	0.049	0.43	1.2	2.3	0.27	0.027	0.02	0.59	4.1	0.034	15	0.12	0.049	0.02
Median Concentration	0.025	0.025	0.025	0.05	0.05	0.01	0.01	0.02	0.07	0.01	0.35	0.01	0.025	0.01
Standard Deviation	0.043	0.93	2.5	7.1	0.81	0.025	0.017	1.2	9.3	0.038	36	0.29	0.044	0.017
Number of Guideline Exceedances	0	0	10	0	0	0	0	0	0	0	26	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	10	0	0	0	0	0	0	0	26	0	0	0

Appendix I
Table G
Groundwater and Surface Water Analytical Results - Combined

	Field Parameters									PFAS																													
	Purge Volume	Purge SWL (mbTOC) (field)	DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)	Total Suspended Solids	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane 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
	L	mbTOC	mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL								10	5	0.02	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02
Commonwealth (Draft) Env. Mgmt. Guidance on PFOS and PFOA - FW 95%																										*220*								*0.13*			
FSANZ - PFAS Drinking water quality guideline																**0.07**										**0.56**											
FSANZ - PFAS Recreational water quality guideline																0.7										5.6											

SampleCode **Field_ID** **Location_Code** **Sampled_Date_Time**

Env Stds Comments

Data Comments

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

Appendix I
Table G
Groundwater and Surface Water Analytical Results - Combined

	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)[WA DER List)
	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01
Commonwealth (Draft) Env. Mgmt. Guidance on PFOS and PFOA - FW 95%			
FSANZ - PFAS Drinking water quality guideline			
FSANZ - PFAS Recreational water quality guideline			

SampleCode	Field_ID	Location_Code	Sampled_Date_Time			
ES1701791007	GW01	GW01	16/12/2016	<0.1	0.57	0.57
ES1701791007R1	GW01	GW01	16/12/2016	<0.1	0.56	0.56
ES1701791007R2	GW01	GW01	16/12/2016	<0.1	0.53	0.53
ES1701791012	GWQA3	GW01	16/12/2016	<0.1	0.71	0.71
ES1712870001	GW01	GW01	25/05/2017	<0.02	2.16	1.87
ES1701791008	GW02	GW02	16/12/2016	<0.1	0.2	0.2
ES1712870002	GW02	GW02	25/05/2017	<0.02	25.4	22.8
ES1712870009	TQA04	GW02	25/05/2017	<0.02	26	23.4
ES1701791009	GW03	GW03	16/12/2016	<0.1	93	82.6
ES1701791009R1	GW03	GW03	16/12/2016	<0.1	65.6	65.6
ES1701791009R2	GW03	GW03	16/12/2016	<0.1	66.4	66.4
ES1712870003	GW03	GW03	25/05/2017	<0.02	398	348
ES1701791010	GW04	GW04	16/12/2016	<0.1	0.2	0.2
ES1712870004	GW04	GW04	25/05/2017	<0.02	0.14	0.14
ES1701791011	GW05	GW05	16/12/2016	<0.1	0.22	0.22
ES1712870005	GW05	GW05	25/05/2017	<0.02	0.65	0.11
ES1712870006	GW06	GW06	25/05/2017	<0.02	<0.01	<0.01
ES1712870007	GW07	GW07	25/05/2017	<0.02	<0.01	<0.01
ES1712870008	GW08	GW08	25/05/2017	<0.02	<0.01	<0.01
ES1701791001	SW01	SW01	16/12/2016	<0.02	2.29	2.25
ES1701791001R1	SW01	SW01	16/12/2016	<0.02	1.7	1.7
ES1701791001R2	SW01	SW01	16/12/2016	<0.02	1.63	1.63
ES1712870010	SW01	SW01	25/05/2017	<0.02	3.01	2.81
ES1701791002	SW02	SW02	16/12/2016	<0.02	0.08	0.08
ES1712870018	SW02	SW02	25/05/2017	<0.02	<0.01	<0.01
ES1701791003	SW03	SW03	16/12/2016	<0.02	1.55	1.52
ES1701791003R1	SW03	SW03	16/12/2016	<0.02	1.13	1.13
ES1701791003R2	SW03	SW03	16/12/2016	<0.02	1.08	1.08
ES1712870019	SW03	SW03	25/05/2017	<0.02	1.55	1.41
ES1701791004	SW04	SW04	16/12/2016	<0.02	0.25	0.25
ES1712870020	SW04	SW04	25/05/2017	<0.02	<0.01	<0.01
ES1701791005	SW05	SW05	16/12/2016	<0.02	213	205
ES1701791005R1	SW05	SW05	16/12/2016	<0.02	160	160
ES1701791005R2	SW05	SW05	16/12/2016	<0.02	166	166
ES1701791006	SWQA1	SW05	16/12/2016	<0.02	208	201
S17-My28782	TQA05	SW05	25/05/2017	<0.01	-	-
ES1712870011	SW05	SW05	25/05/2017	<0.02	58.6	55.8
ES1712870021	SW06	SW06	25/05/2017	<0.02	0.15	0.15
ES1712870022	SW07	SW07	25/05/2017	<0.02	<0.01	<0.01
ES1712870012	SW08	SW08	25/05/2017	<0.02	0.06	0.06
ES1712870023	SW09	SW09	25/05/2017	<0.02	<0.01	<0.01

Statistical Summary

Number of Results	41	40	40
Number of Detects	0	33	33
Minimum Concentration	<0.01	<0.01	<0.01
Minimum Detect	ND	0.06	0.06
Maximum Concentration	<0.1	398	348
Maximum Detect	ND	398	348
Average Concentration	0.02	38	35
Median Concentration	0.01	0.895	0.895
Standard Deviation	0.017	83	76
Number of Guideline Exceedances	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0

Appendix I
Table G
Groundwater and Surface Water Analytical Results - Combined

	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)[WA DER List)
	µg/L	µg/L	µg/L
EQL	0.02	0.01	0.01
Commonwealth (Draft) Env. Mgmt. Guidance on PFOS and PFOA - FW 95%			
FSANZ - PFAS Drinking water quality guideline			
FSANZ - PFAS Recreational water quality guideline			

SampleCode	Field_ID	Location_Code	Sampled_Date_Time

Env Stds Comments

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

Appendix C – Water use survey

Fire & Rescue NSW

PFAS Environmental Investigation Report
Albion Park Water Use Survey - May 2017

October 2017

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Figure index

Appendices

1. Introduction

1.1 Background

Fire & Rescue NSW (FRNSW) has conducted a preliminary investigation into the presence of per- and poly-fluoroalkyl substances (PFAS) on, and in the vicinity of, the FRNSW's Albion Park training site, located on the south coast of NSW.

This investigation is part of a review of a number of FRNSW sites across NSW where legacy firefighting foams containing PFAS have been stored, used and disposed of. PFAS are emerging contaminants, which means that the ecological and/or human health effects are unclear. FRNSW is investigating to better understand the nature and extent of PFAS across its sites and assess potential risks to human health or ecology, including the identification of pathways through which people may be exposed to these chemicals.

GHD was engaged to undertake this preliminary environmental investigation, commencing in June 2016 and reaching completion in February 2017. These works included a community engagement component, where GHD consulted with property owners to understand water use within the investigation area. This involved the distribution of fact sheets, and the hosting of meetings and an information session. A *water use survey* was also distributed to a sample set of landowners within the Albion Park area.

1.2 Purpose

The purpose of this report is to summarise the results from a water use survey that was distributed to a number of landowners in the Albion Park area. This survey was conducted to obtain information from local Albion Park landowners about water use at individual properties, particularly in relation to household water use. The results detailed in this report intend to assist FRNSW in developing appropriate PFAS management strategies for the local area.

1.3 Methodology

The chosen survey method was a five page paper based questionnaire developed to acquire both qualitative and quantitative responses to 22 questions. The survey was targeted to a number of properties in the Albion Park area. The recommended survey distribution area has been divided into two stages following Environmental Protection Authority (EPA) recommendations. The survey has been distributed to properties within the boundaries of stage one, with stage two distribution to be undertaken depending on the response rate. See Figure 1 for the distribution map.

The stage 1 distribution area includes properties located on the down gradient of the FRNSW training facility and landowners north of Albion Park Creek. The survey pack delivered included a cover letter, fact sheet, survey and a postage paid return envelope to assist response. The EPA

This report is based on 27 questionnaire responses received from a mail out that was sent to 176 property owners and residents over a period of three weeks. Residents were also encouraged to complete the survey during meetings with the EPA, and during a community information session held at Albion Park Community Centre on Tuesday 16th May. The survey was also available online at: https://www.fire.nsw.gov.au/page.php?id=9175

A blank copy of the water use survey, the cover letter, and the fact sheet is attached to this report in Appendix A–Water Use Survey.

Figure 1: Water Use Survey Distribution Are - Albion Park

2. Summary of key findings

We received 27 survey responses, providing the following findings into water use on properties in Albion Park:

- The majority of respondents indicated that they are private residential owners (74%).
- The majority of respondents primarily used town water as their water source (89%).
- No respondents indicated that they have bores located on their properties.
- One respondent indicated that they use surface or a dam water on their property.
- Four respondents indicated that they or their families use local creeks for recreational purposes (fishing or swimming).

3. Water use

It is evident that those who participated in this survey use town water as their main water source. The majority of landowners or tenants surveyed live on residential properties, 82.4% of which use town water as their only water source.

No respondents indicated that they use bore water on their property. The number of respondents who use surface or dam water is low, with only one respondent indicating that they use dam water for domestic use and watering vegetables/fruit trees. The use of local creeks recreationally is similarly low, with two respondents using creeks for fishing and one of these also using creeks for swimming.

3.1 General property information

3.1.1 Property type

The survey respondents were asked what type of property they owned. From the 27 respondents, 20 stated that they were privately owned residences (74%). Four of the survey respondents specified that they were the owner of either an industrial or commercial agricultural property (14%) and one did not specify their property type. Two respondents stated their property was a commercial office space, this has been categorised under ‘other’.

Those surveyed were mostly residing in private residential properties, as illustrated in Figure 1.

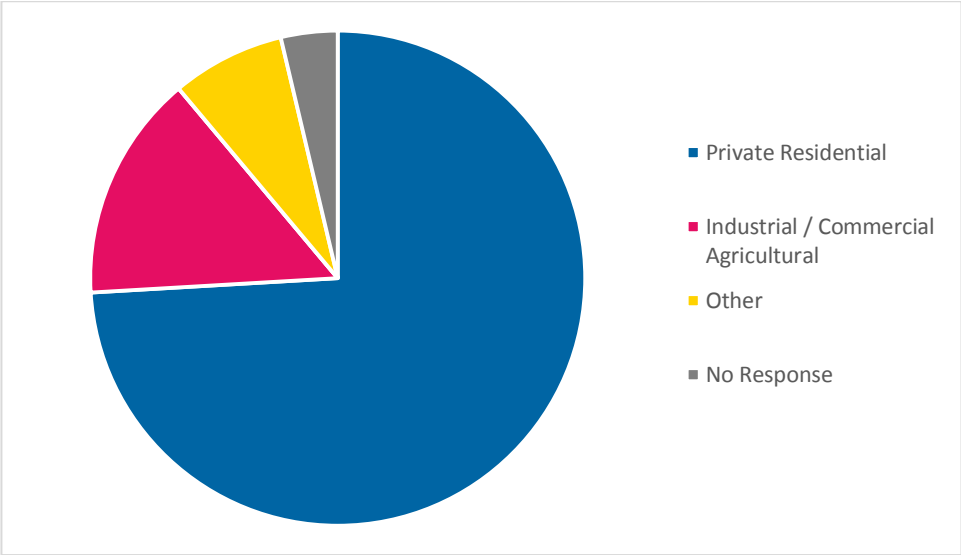

Figure 2: Breakdown of property types

3.1.2 Water source

We asked respondents to specify how water is supplied to their property. From the 27 respondents, 24 stated that their property is supplied by town water (89%). Two respondents specified that their property was supplied by both town water and rain water (7%). One respondent did not specify his/her water source.

This data is presented graphically in Figure 2.

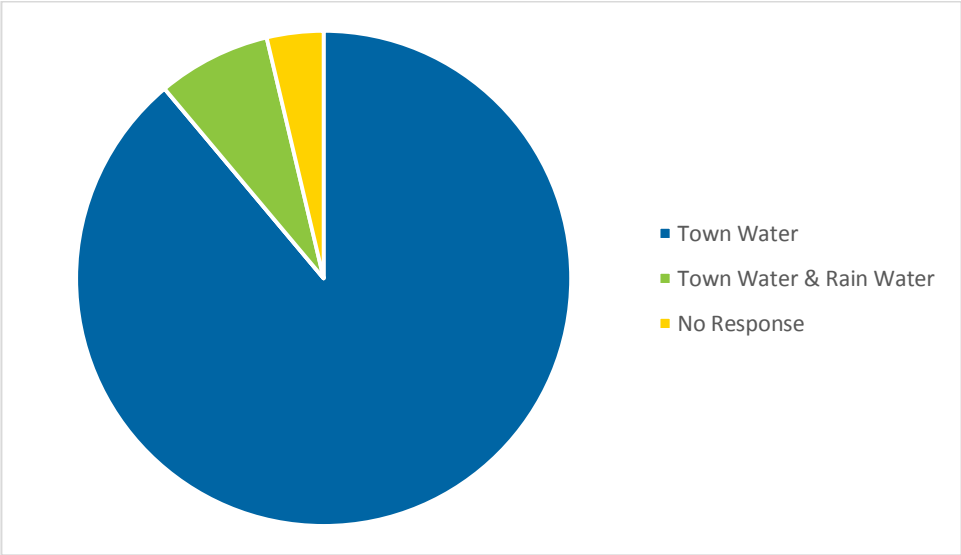

Figure 3: Breakdown of water sources

3.2 Bore water use

No respondents indicated that they use, or have used, a bore on their property. There is therefore no data arising from this survey related to bore water usage, including number of bores, licenses or usage.

3.3 Surface or dam water use

One respondent indicated that they have been using dam water since 1989 for both domestic and non-domestic activities including:

- Domestic use, including drinking, cooking, showering, washing and cleaning;
- Vegetable watering and fruit tree watering.

3.4 Recreational use of local creeks

The majority of respondents indicated that they do not use local creeks for recreational purposes (18 respondents, representing 66%). Three respondents indicated that they use local creeks for fishing (11%), while one respondent uses local creeks for fishing and swimming (3%). Five respondents did not specify if they used local creeks for recreational purposes (18%).

This data is presented graphically in Figure 3.

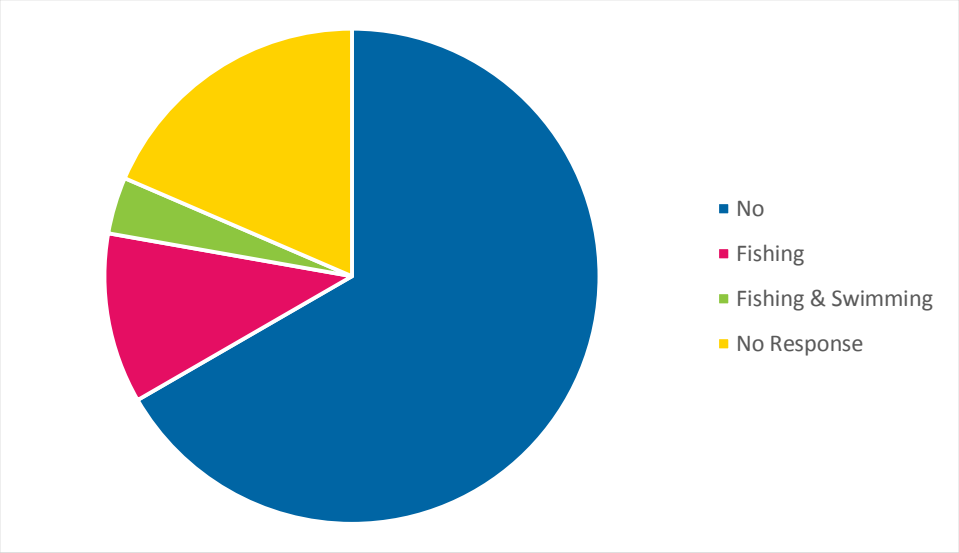

Figure 4: Recreational use of local creeks

3.5 Additional water usage comments

Some respondents made additional comments at the end of the survey, including:

- One respondent commented on the use of rainwater on their property (for non-domestic purposes);
- One respondent advised that the local high School (where their children attended) uses bore water for bubblers.
- One respondent walks dogs past the fire service dam and has done for years including when it is wet

4. Conclusions

The results of this water use survey aim to assist FRNSW to build a deeper understanding of local water resources and water use, currently and historically.

Those residents who participated in this survey primarily use town water as their dominant water source. However, there are two residents who indicate they use or have used surface or dam water for vegetable watering and general household use.

The sample size of those surveyed is small (27). While the data collected so far provides some valuable insights in understanding existing and historic water use, it is likely that FRNSW will require a larger response rate in order to capture a more accurate understanding of water use habits in the area adjacent to FRNSW's Albion Park training facility. This will particularly relate to others not surveyed and may rely on surface water for household use, providing pathway for potentially impacted PFAS surface or dam water. Should the environmental investigations show elevated levels of PFAS in the study catchment area this Water Use Survey will need to be intensified to ensure a representative number of residents are surveyed to inform recommendations for ongoing domestic water use for those residents who may be subject to potentially contaminated water sources.

Appendices

Appendix A –Water Use Survey

Fire & Rescue NSW – PFAS Environmental Investigation Project - Water Use Survey – April 2017

Fire & Rescue NSW (FRNSW) is undertaking an environmental investigation and assessment of soil, groundwater and surface water surrounding some of FRNSW's training sites.

This water use survey is designed to help FRNSW to better understand how members of the community in the field investigation area might be using bore water. This will assist FRNSW in recommending appropriate management strategies until FRNSW understands any potential offsite impacts of PFAS in the groundwater.

We have prepared this short survey to obtain information from your household water use. We encourage you to complete the survey and submit it to us via:

Email: pfasinvestigation@fire.nsw.gov.au

By Post (in enclosed envelope):
Fire &Rescue NSW - PFAS Environmental Investigation (Sally Langley); Locked Mail Bag 12, Greenacre NSW 2190

If you have any questions at all, please contact us on **1800 316 663**
or visit our project website where there is more information about this investigation available www.fire.nsw.gov.au/pfas

Name	
Phone number	
Email	
Postal address	
Property address *(the subject of this survey)*	

This information is being collected to inform FRNSW's investigation of, and response to, the potential groundwater contamination in the area adjacent to FRNSW training sites. The collection of this information is voluntary. If you choose not to provide this information, FRNSW will find it difficult to take into account your specific circumstances.

Fire & Rescue NSW

The information you provide may be shared with FRNSW's technical advisors, relevant government agencies and organisations, and business entities directly involved in the response to the potential groundwater contamination. This information will not be made publicly available.

1. How would you classify the use of your property that is in the vicinity of the FRNSW training facility?

- ◯ Private residential
- ◯ Industrial / Commercial Agricultural
- ◯ Horticultural
- ◯ Other (please specify) _____

2. How is water supplied to your property?

- ◯ Town water
- ◯ Rain water
- ◯ Bore water

3. If you have a bore on your property is it active/do you use it? *(If you don't have an active bore or use bore water at all please go to question 14).*

- ◯ Yes, I do have an active bore on the property
- ◯ No I do not use the bore, but I have used in the past.
  (*Please provide the year it was last active if you know it*) _____
- ◯ No, I have never used the bore

4. If you answered yes to question 3, how many bores do you have on your property (in working condition).

- ◯ 1
- ◯ 2
- ◯ Please specify: _____

5. Are these bores licensed / registered?

- ◯ Yes
- ◯ No
- ◯ Unsure

6. What volume of water are you permitted to extract under your licence?

- ◯ Please specify: _____
- ◯ Unsure

7. What activities do you currently use bore water for on your property?

Fire & Rescue NSW

- ◯ Domestic (home) use
- ◯ Crop irrigation
- ◯ Cattle, stock, horse watering
- ◯ Vegetable watering
- ◯ Fruit tree watering
- ◯ Swimming pools
- ◯ Other. *Please specify*: _____

8. If you use or have used the bore water in your home please select the use/s?

   - ◯ Drinking
   - ◯ Other household (*please circle use*). Cooking, swimming, showering, washing, gardening, domestic animal washing/feeding.

   Other use not listed _____ *(please specify.)*

   - ◯ Flushing toilets only.

9. How long have you been using bore water for the purpose(s) noted above?

   _____

10. If you use bore water for crop irrigation, please specify the type of crops irrigated and the approximate area irrigated

    _____

11. If you use bore water for cattle / stock / horse watering, please specify the type and approximate number of stock on your property.

    _____

12. If you use bore water for watering of vegetables / fruit trees, please specify the type of vegetables / fruit trees.

    _____

13. Do you consume any of the following produce that is grown on your property and water using bore water?

    - ◯ Chicken meat
    - ◯ Eggs
    - ◯ Other meat. *Please specify*: _____
    - ◯ Milk
    - ◯ Fruit
    - ◯ Vegetables

    Other produce not listed. *Please specify:* _____

14. What activities do you currently use surface or dam water for on your property?

Fire & Rescue NSW

- ◯ Domestic (home) use
- ◯ Crop irrigation
- ◯ Cattle, stock, horse watering
- ◯ Vegetable watering
- ◯ Fruit tree watering
- ◯ Swimming pools
- ◯ Other. *Please specify*: _____

15. If you use or have used the surface or dam water in your home please select the use/s?

- ◯ Drinking
- ◯ Other household (*please circle use*). Cooking, swimming, showering, washing, gardening, domestic animal washing/feeding.

Other use not listed _____ *(please specify.)*

- ◯ Flushing toilets only.

16. How long have you been using surface or dam water for the purpose(s) noted above?

_____

17. If you use surface or dam water for crop irrigation, please specify the type of crops irrigated and the approximate area irrigated

_____

18. If you use surface or dam water for cattle / stock / horse watering, please specify the type and approximate number of stock on your property.

_____

19. If you use surface or dam water for watering of vegetables / fruit trees, please specify the type of vegetables / fruit trees.

_____

20. Do you consume any of the following produce that is grown on your property and water using surface or dam water?

- ◯ Chicken meat
- ◯ Eggs
- ◯ Other meat. *Please specify*: _____
- ◯ Milk
- ◯ Fruit
- ◯ Vegetables

Other produce not listed. *Please specify:* _____

Fire & Rescue NSW

21. Do you or any of your family use local creeks for recreational purposes?

◯ Yes *(please specify the activity)* swimming, fishing, yabbying etc.

_____

◯ No

22. Please provide any additional comments about your water use.

_____

_____

_____

Thank you for completing this survey.

GHD

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	C. Pignatelli	B. Campany		B. Campany		24/10/2017

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Appendix D – Assessment of data quality

Quality Assurance and Quality Control Report

Data Quality Indicators

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

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

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

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

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

Data quality indicator	Frequency	Data quality acceptance criteria
Precision		
Inter/ intra duplicates	1 / 10 samples	<30-50% RPD
Accuracy		
Surrogate spikes	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	-
Samples extracted and analysed within holding times	All samples	Organics (7-14 days) Inorganics (6 months)

Data quality indicator	Frequency	Data quality acceptance criteria
		Some exceptions to these holding times are listed below ([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 F.
- Field instrument field checks were undertaken on the equipment:
  - Interface probe: A daily equipment check was undertaken to ensure that the equipment worked correctly when immersed in water and that it has had no unauthorised repairs.
  - Low flow pump: The low flow sampling equipment was provided by the equipment supplier 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. GHD measured the rate of water discharge during purging to ensure that the rate did not exceed 1 L per minute. Purge volumes were recorded on the groundwater sampling field sheets for each site.

Groundwater sampling and analysis quality control

The QC samples collected during the investigation are described below.

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

Table 2 Quality control (QC) sampling frequency

Sample	Recommended sampling rate	Media	No. QC samples	No. of primary samples	Total
Intra	1/10 samples	Soil	1	6	7
Intra	1/10 samples	Sediment	1	9	10
Intra	1/10 samples	Groundwater	1	8	9
Inter	1/10 samples	Surface water	1	9	10

- Two soil trip blanks and one water trip blank accompanied the samples to the laboratory. All trip blanks were less than the limit of detection of the laboratory.
- Three rinsates were collected during the soil and water sampling on each day from hand tools and interface probe used during the three days of investigation. All rinsates were less than the limit of detection of the laboratory.

Relative percentage difference calculations

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

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

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

Table 3 Analysed quality control (QC) samples

Primary sample	QC sample laboratory ID	QC sample field ID	Date sampled	Lab report number	Matrix
GW06_6.0-6.1	ES1712281008	TQA01	18/05/2017	ES1712281	Soil
SS05	ES1712870016	TQA06	25/05/2017	ES1712870	Sediment
GW02	ES1712870009	TQA04	25/05/2017	ES1712870	Ground water
SW05	S17-My28782	TQA05	25/05/2017	548034	Surface Water

RPD exceedances were reported during this investigation.

TQA06 – Primary sample SS05 – Perfluorodecanesulfonic acid (PFDS) 58%

- Perfluorohexane sulfonic acid (PFHxS) 56%
- Perfluorooctane sulfonic acid (PFOS) 89%
- Perfluorooctane sulfonamide (FOSA) 117%

TQA05 – Primary sample SW05 - Perfluorooctane sulfonamide (FOSA) 102%

- Perfluoropentanoic acid 73%
- 6:2 Fluorotelomer Sulfonate (6:2 FTS) 87%

Laboratory quality assurance / quality control

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

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

Laboratory quality control procedures

Laboratory QC samples incorporated in the analytical process include:

Laboratory blind duplicate samples

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

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

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

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

Matrix spike recoveries

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

Laboratory control sample

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

Surrogate spike recoveries

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

Method blank samples

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

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

Laboratory quality control results

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

Table 5 Summary of outliers

Laboratory report	Quality Control Sample	Analytes	Sample Code	results	Comment
ES1712281	Matrix Spikes	Perfluorooctane sulfonic acid (PFOS)	Anonymous	Not determined	MS recovery not determined. Background level greater than or equal to 4x spike level.
ES1700845	Matrix Spikes	Perfluorooctane sulfonic acid (PFOS)	Anonymous	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.

Sample preservation

All samples were preserved appropriately in the correct sample containers.

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 2.8** namely representativeness, completeness, comparability, precision and accuracy.

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

systematic methods, as required by GHD's QA system. GHD considers that the laboratory data are of a suitable quality for assessing the environmental status of the site.

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

Appendix E – Borehole Logs

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW06

Client Fire & Rescue NSW
Project Albion Park FRNSW Site Investigation
Project No. 212558302
Site Albion Park FRNSW
Location Airport Road, Albion Park Rail, NSW 2527
Date Drilled 18/05/2017 - 18/05/2017

Drill Co. Terratest Pty Ltd
Driller Dan Jones
Rig Type Tracked Geoprobe
Drill Method HA & PT
Total Depth (m) 7.2
Diameter (mm) 125

Easting, Northing 297427.528, 6173717.756
Grid Ref GDA94_MGA_zone_56
Elevation 4.531
Collar RL 4.436
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	GW06_0.0_0.1_483				Clayey SAND, medium to coarse, poorly graded, subangular, pale brown, some fine sand (FILL)	D	MD	No odour, No staining	4.5
0.5	PT							SM	ST	No odour, No staining	4
1		0	GW06_1.0_1.1_484		Grout		Sandy CLAY, low to medium plasticity, medium to coarse, olive- brown (NATURAL - SOIL)				3.5
1.5							Gravelly CLAY, low to medium plasticity, red- orange and brown- grey (NATURAL - SOIL)	SM	VST	No odour, No staining	3
2		0	GW06_2.0_2.1_485								2.5
2.5							CLAY, low to medium plasticity, grey and pale grey (NATURAL - SOIL)	M	ST	No odour, No staining	2
3		0	GW06_3.0_3.1_486		Bentonite						1.5
3.5											1
4		0	GW06_4.0_4.1_487				Sandy CLAY, low to medium plasticity, grey- brown (NATURAL - SOIL)	M	ST	No odour, No staining	0.5
4.5											0
5		0	GW06_5.0_5.1_488		Sand						-0.5
5.5				▽			Sandy CLAY, low plasticity, grey (NATURAL - SOIL)	VM	F	No odour, No staining	-1
6		0	GW06_6.0_6.1_489 (TQA01)								-1.5
6.5											-2
7		0	GW06_7.1_7.2_490				Sandy CLAY, low plasticity, grey (NATURAL - SOIL)	W	F	No odour, No staining	-2.5
7.5							Termination Depth at: 7.20 m. Target depth achieved.				-3
8											-3.5
8.5											-4
9											-4.5
9.5											-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-GROUNDWATER

MONITORING WELL GW07

Client Fire & Rescue NSW
Project Albion Park FRNSW Site Investigation
Project No. 212558302
Site Albion Park FRNSW
Location Airport Road, Albion Park Rail, NSW 2527
Date Drilled 18/05/2017 - 18/05/2017

Drill Co. Terratest Pty Ltd
Driller Dan Jones
Rig Type Tracked Geoprobe
Drill Method HA & PT
Total Depth (m) 6.2
Diameter (mm) 125

Easting, Northing 297484.677, 6173648.639
Grid Ref GDA94_MGA_zone_56
Elevation 4.774
Collar RL 4.692
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	GW07_0.0_0.1_491		Grout		Clayey SAND, fine, poorly graded, pale brown (FILL)	SM	MD	No odour, No staining	4.5
0.5		0	GW07_0.5_0.6_492				CLAY, low to medium plasticity, olive-brown (NATURAL - SOIL)	SM	S	No odour, No staining	
1	PT	0	GW07_1.0_1.1_493				CLAY, low to medium plasticity, red- grey and orange (NATURAL - SOIL)	M	ST	No odour, No staining	4
1.5											3.5
2		0	GW07_2.0_2.1_494		Bentonite						3
2.5											2.5
3		0	GW07_3.0_3.1_495 (TQA02)				Sandy CLAY, low plasticity, orange and grey, some fine sand (NATURAL - SOIL)	M	F	No odour, No staining	2
3.5											1.5
4		0	GW07_4.0_4.1_496		Sand						1
4.5											0.5
5		0	GW07_5.0_5.1_497				Sandy CLAY, low plasticity, grey, some fine sand (NATURAL - SOIL)	VM	F	No odour, No staining	0
5.5											-0.5
6		0	GW07_6.1_6.2_498								-1
6.5							Termination Depth at: 6.20 m. Target depth achieved.				-1.5
7											-2
7.5											-2.5
8											-3
8.5											-3.5
9											-4
9.5											-4.5
											-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-GROUNDWATER

MONITORING WELL GW08

Client Fire & Rescue NSW
Project Albion Park FRNSW Site Investigation
Project No. 212558302
Site Albion Park FRNSW
Location Airport Road, Albion Park Rail, NSW 2527
Date Drilled 18/05/2017 - 18/05/2017

Drill Co. Terratest Pty Ltd
Driller Dan Jones
Rig Type Tracked Geoprobe
Drill Method HA & PT
Total Depth (m) 6.2
Diameter (mm) 125

Easting, Northing 297743.275, 6173909.756
Grid Ref GDA94_MGA_zone_56
Elevation 2.482
Collar RL 2.384
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	GW08_0.0_0.1_499		Grout		Clayey SAND, fine, dark grey and black (FILL)	SM	MD	No odour, No staining	2
0.5		0	GW08_0.5_0.6_500								
1	PT	0	GW08_1.0_1.1_501				Sandy CLAY, low plasticity, orange- grey and brown, some fine to medium sand (NATURAL - SOIL)	M	S	No odour, No staining	1.5
1.5							Sandy CLAY, low to medium plasticity, dark grey and red, some fine sand (NATURAL - SOIL)	SM	ST	No odour, No staining	1
2		0	GW08_2.0_2.1_502		Bentonite						0.5
2.5											0
3		0	GW08_3.0_3.1_503								-0.5
3.5							Sandy CLAY, low to medium plasticity, red- grey and orange, some fine sand (NATURAL - SOIL)	M	ST	No odour, No staining	-1
4		0	GW08_4.0_4.1_504		Sand						-1.5
4.5											-2
5		0	GW08_5.0_5.1_505 (TQA03)								-2.5
5.5							CLAY, low to medium plasticity, grey (NATURAL - SOIL)	SM	VST	No odour, No staining	-3
6		0	GW08_6.1_6.2_506								-3.5
6.5							Termination Depth at: 6.20 m. Target depth achieved.				-4
7											-4.5
7.5											-5
8											-5.5
8.5											-6
9											-6.5
9.5											-7

Notes

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

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

Appendix F – Field sampling sheets and calibration certificates

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW01

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 2.985 m **Logic Check:** ✓
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:~~.....~~ to~~.....~~ m **Stick Up:** ..... m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:** ~~.....~~ **Bore Diam.:** 50 mm
Sampler: T. Nham 23/5/17	**Flow Cell:** Y / N **Pump Depth:** 6 m	**Ref.datum:** ~~.....~~ **Well Cap Secure?** ✓
Date:	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 6.30 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
10104	1	3.31	0.18	10274	6.81	8.6	19.6		Odour.
10107	2	3.76	6.79	8924	5.79	-18.1	19.6		"
10110	3	4.08	1.26	7654	6.01	-65.0	19.6		"
10113	4	4.37	1.74	6402	6.25	-81.6	19.7		"
10116	5	4.59	2.15	5572	6.45	-83.8	19.8		"
10119	6	4.68	2.59	5317	6.58	-85.9	19.8		"
10122	7	4.83	2.75	5208	6.83	-86.4	19.8		"

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

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW02

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 3.135 m **Logic Check:** /
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:.....to..... m **Stick Up:** ..... m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:** / **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:** 6 m	**Ref.datum:** / **Well Cap Secure?** /
Date: 25/5/17	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 6.68 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
9:30	1	3.83	0.11	5782	8.00	-189.9	19.3		Brown cloudy -
9:32	2	6.08	0.13	5818	8.36	-224.7	19.4		"
9:34	3	4.30	0.18	5399	8.83	-207.7	19.4		"
9:37	4	4.55	0.21	4388	10.59	-186.3	19.4		"
9:40	5	4.71	0.21	4183	10.58	-180.6	19.4		"
9:43	6	4.73	0.21	4355	10.33	-181.5	19.4		"
9:46	7	4.73	0.23	4464	10.15	-180.3	19.4		"

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

TDA04

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW03

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 2.485 m **Logic Check:** ✓
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:✓to..... m **Stick Up:** ✓ m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:**✓ **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:** 6 m	**Ref.datum:** ✓ **Well Cap Secure?** ✓
Date: 25/5/16	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 6.24 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
11:20	1	3.02	0.18	6598	5.01	13.7	18.7		Clear.
11:24	2	3.41	0.46	6639	4.87	3.5	18.8		"
11:27	3	3.67	0.57	6616	4.79	-2.2	18.8		"
11:30	4	3.86	0.75	6553	4.74	-6.3	18.8		"
11:33	5	4.03	1.03	6422	4.79	-13.4	18.7		"
11:36	6	4.16	1.38	6157	4.92	-22.7	18.7		"
11:39	7	4.33	1.84	5529	5.14	-34.5	18.7		"
11:42	8	4.44	2.18	4990	5.26	-39.8	18.7		"
11:45	9	4.53	2.13	4889	5.24	-41.5	18.7		"

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

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW04

Job Information	Sampling Information	Bore Information
Client: FRNSW	Purge Method: Perisaltic Pump	SWL: 2.292 m — Logic Check: ✓
Project: Albion Park	Sample Method: Perisaltic Pump	Screen: From: / to: m — Stick Up: m
Proj. No.: 21-25583-13	WQ Meter Type: YSI Quadro	NAPL Check: / — Bore Diam.: 50 mm
Sampler: T. Nham	Flow Cell: Y / N — Pump Depth: 6 m	Ref.datum: / — Well Cap Secure? ✓
Date: 25/5/17	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 6.05 m
Round May-17	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
12:03	1	2.84	0.31	7888	4.26	29.2	19.2		Clear.
12:06	2	3.11	0.40	7887	4.22	23.5	19.2		"
12:09	3	3.41	0.68	7715	4.24	27.9	19.3		"
12:12	4	3.60	1.20	6956	4.67	31.1	19.3		"
12:15	5	3.84	2.03	6043	5.00	32.4	19.3		"
12:18	6	4.01	2.81	5127	5.26	29.3	19.3		"
12:21	7	4.17	2.76	5122	5.26	31.1	19.2		"
12:24	8	4.26	2.47	5445	5.19	30.1	19.2		"

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

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW05

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 2.630 m **Logic Check:** /
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:/ to m **Stick Up:** / m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:** / **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:** 6 m	**Ref.datum:** / **Well Cap Secure?** /
Date: 25/5/17	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 6.20 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
12:44	1	3.06	0.69	12819	3.75	28.8	19.4		Clear,
12:47	2	3.22	1.35	12613	3.76	27.4	19.4		"
12:50	3	3.36	2.12	12146	3.78	31.0	19.4		"
12:53	4	3.54	2.58	10903	3.83	38.8	19.4		"
12:56	5	3.54	2.62	10321	3.94	39.6	19.4		"
12:59	6	3.54	2.62	10089	3.96	39.4	19.4		"

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

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW06

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 2.260 m **Logic Check:** ✓
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:.....to..... m **Stick Up:** ..... m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:**..... **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:** 6 m	**Ref.datum:** ..... **Well Cap Secure?** ✓
Date: 25/5/17	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 6.30 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
13:25	1	2.39	0.36	2395	5.06	43.1	19.9		Cloudy.
13:28	2	2.40	0.46	2363	4.86	21.9	20.0		"
13:31	3	2.41	0.74	2372	4.66	-0.8	19.9		"
13:34	4	2.41	0.90	2366	4.58	-6.2	19.9		"
13:37	5	2.42	1.12	2373	4.55	-12.3	20.0		"
13:40	6	2.42	1.29	2368	4.55	-15.6	19.9		"

Field QA Checks:

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

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

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

Purge Volumes

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

*Double for gravel pack

Purging and Sampling Record

Bore ID: GW07

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 2.408 m **Logic Check:**
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From: to m **Stick Up:** m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:** **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:** 5.5 m	**Ref.datum:** **Well Cap Secure?**
Date: 25/5/17	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 5.82 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
13:56	1	2.49	0.79	10071	4.42	116.8	19.4		cloudy, brown
13:59	2	2.49	0.79	10236	4.45	113.8	19.3		"
14:02	3	2.49	0.92	10020	4.15	111.8	19.3		"
14:05	4	2.50	1.13	9919	3.94	116.2	19.3		"
14:08	5	2.50	1.52	9930	3.86	123.0	19.2		"
14:12	6	2.50	1.71	9960	3.82	130.2	19.2		"

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

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GW08

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** 1.120m m **Logic Check:**
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:.....to..... m **Stick Up:** ..... m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:** **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:**.....m	**Ref.datum:** **Well Cap Secure?**
Date: 25/5/17	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 5.83 m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
14:32	1	1.58	3.87	7662	4.52	163.3	18.2		Clear
14:35	2	1.81	3.21	6424	4.57	189.4	18.3		"
14:38	3	2.20	3.15	6295	4.56	191.1	18.3		"
14:41	4	2.56	3.09	6260	4.55	202.1	18.3		"
14:44	5	2.82	2.98	6177	4.53	208.6	18.3		"
14:48	6	2.96	2.87	6090	4.54	211.1	18.3		"

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

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: Surface Water

Job Information	Sampling Information	Bore Information
Client: FRNSW	**Purge Method:** Perisaltic Pump	**SWL:** ..... m **Logic Check:** .....
Project: Albion Park	**Sample Method:** Perisaltic Pump	**Screen:** From:.....to..... m **Stick Up:** ..... m
Proj. No.: 21-25583-13	**WQ Meter Type:** YSI Quadro	**NAPL Check:**..... **Bore Diam.:** 50 mm
Sampler: T. Nham	**Flow Cell:** Y / N **Pump Depth:**.....m	**Ref.datum:** ..... **Well Cap Secure?**.....
Date:	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** ..... m
Round May-17	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	SWL mbtoc	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Temp (°C)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*stable*	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	-		
25/5/17	SW05	=	5.32	136.6	7.56	-30.7	14.5		(TRA05) Clear/slightly cloudy
	SW01	=	3.44	334.4	5.78	~~24.7~~	12.8		Clear
	SW08	=	5.02	43275	6.98	118.3	19.0		Clear-, mud flats.
26/5/17	SW06	=	12.35	1228	8.71	10.2	9.2		Clear, shallow concrete creek, little water
	SW04	=	3.80	39258	7.36	86.2	14.6		Clear.
	SW09	<	6.38	38631	7.60	95.7	13.8		Clear
	SW02	=	5.34	664	7.85	29.5	13.2		Clear, standy drain water/ood.
	SW03	=	0.98	352.8	7.31	-61.2	11.5		clear, sediments, suspended organics
	SW07	<	0.15	350.8	7.06	5.1	12.5		Lots of ~~sed~~ suspended sed/organics, reeds.

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

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-105762

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	**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		97.6ppm

Calibrated by: **Joanna Wong**

Calibration date: **15/05/2017**

Next calibration due: **14/06/2017**

Client	FRNSW	Contractor		Groundwater Strike - m bgl		Logged By	TW
Project							
Project No.	/	Level (m AHD)		Groundwater Level (after 20 mins) - mbgl		GHD	Level 15, 133 Castlereagh Street, Sydney, NSW 2000
Location	Albert Park	Co-ordinates	E				
Date Drilled	25/5/17		N				

Location No.: Sediment Samples

Depth From (m bgl)	Depth To (mbgl)	Sample Depth From (m bgl)	Sample Depth To (m bgl)	Sample Type	PID (ppm)	Natural / Fill	Secondary Composition: gravelly / sandy / silty / clayey etc.	Primary Composition: BOULDER/ COBBLE/ GRAVEL/ SAND/ SILT/ CLAY/ ORGANIC	Colour: black / white / grey / red / brown / orange / yellow / green / blue Include: pale, dark or mottled	Cohesive Soils (e.g. Clays) Plasticity: low plasticity, medium plasticity, high plasticity	Cohesive Soils Consistency: Very Soft, Soft, Firm, Stiff, Very Stiff, Hard	Granular Soils (e.g. Gravels) Particle Size: Fine, Medium, Coarse	Particle Characteristics: Well Graded / Poorly Graded / Gap Graded / Uniform	Particle Shape: Rounded / Sub-rounded / Sub-angular / angular	Composition (e.g. Sandstone, Quartz, Organic etc.)	Consistency: Very loose, Loose, Medium Dense, Dense, Very Dense)	Moisture: Dry / Slightly Moist / Moist / Very Moist / Wet	Zoning: lens / layers / pockets / Cemented	Fill Materials e.g. glass, metal, ash, brick, asbestos, concrete etc.	Odours: (Description & Strength) / PSH
25/5/17 GL			SS05 (TGA06)					CLAY	orange grey brown	M-H	soft	—	—	—	—	—	W		sediment clay lots of organics.	
			SS01				Clayey	SAND	dk grey/black	—	—	F-Sand	PG	ang	Fill	MD	W		organics asphalt gravel, roadbase.	trace litter
			SS08					CLAY	grey brown	MH	V soft	—	—	—	—	—	W		mudflats	
26/5/17			SS06					SAND	grey	—	—	F-M sand	—	—	Concrete R/B ?	—	W		Sand from roads.	
			SS04				Gravelly	SAND	Lt grey	—	—	F-M sand C-grav	PG	angular	R/B	—	W		Roadbase gravel	
			SS02				Gravelly	SAND	Lt grey/br	—	—	F-M sand C-grav	PG	angular	R/B	—	W		Roadbase gravel	
			SS09				Sandy	CLAY	Lt brown/grey	M	soft	F Sand	PG	—	—	—	W		mudflats.	

Investigation Method	Solid Flight Auger	(mm)	Hollow Flight Auger	(mm)	Hand Auger	(mm)	Push Tube	(mm)	Test Pit	m by m	Other
Investigation Abandonment	Backfill and Compact - Y / N	Monitoring Well - Y / N	Termination Depth (m)		Termination Reason:	Refusal / Proposed Depth / Instability / Water Ingress / Other:					
Well Construction Details	Well Diameter (mm)	Depth (m)	Screen From (m)	Screen To (m)	Casing From (m)	Casing To (m)	Well Cover: Gatic / Monument / Other				
			Gravel / Sand From (m)	Gravel / Sand To (m)	Bentonite Seal From (m)	Bentonite Seal To (m)					
Additional Comments											

Client	CENV	Contractor		Groundwater Strike - m bgl		Logged By	
Project							
Project No.		Level (m AHD)		Groundwater Level (after 20 mins) - mbgl		GHD	Level 15, 133 Castlereagh Street, Sydney, NSW 2000
Location	Albion Park	Co-ordinates	E				
Date Drilled	26/5/17		N				

Location No.

Sediment Samples

Depth From (m bgl)	Depth To (mbgl)	Sample Depth From (m bgl)	Sample Depth To (m bgl)	Sample Type	PID (ppm)	Natural / Fill	Secondary Composition: gravelly / sandy / silty / clayey etc.	Primary Composition: BOULDER/ COBBLE/ GRAVEL/ SAND/ SILT/ CLAY/ ORGANIC	Colour: black / white / grey / red / brown / orange / yellow / green / blue Include: pale, dark or mottled	Cohesive Soils (e.g. Clays)		Granular Soils (e.g. Gravels)					Moisture: Dry / Slightly Moist / Moist / Very Moist / Wet	Zoning: lens / layers / pockets / Cemented	Fill Materials e.g. glass, metal, ash, brick, asbestos, concrete etc.	Odours: (Description & Strength) / PSH
										Plasticity: low plasticity, medium plasticity, high plasticity	Consistency: Very Soft, Soft, Firm, Stiff, Very Stiff, Hard	Particle Size: Fine, Medium, Coarse	Particle Characteristics: Well Graded / Poorly Graded / Gap Graded / Uniform	Particle Shape: Rounded / Sub-rounded / Sub-angular / angular	Composition (e.g. Sandstone, Quartz, Organic etc.)	Consistency: Very loose, Loose, Medium Dense, Dense, Very Dense)				
26/5/17 GL																				
	SS03							CLAY	lgt brn grey	L-M	Soft						W		clay sediment roots, reeds	
	SS07							CLAY	lgt brown	L-M	V. Soft						W		roots, reeds, little water.	

Investigation Method	Solid Flight Auger	(mm)	Hollow Flight Auger	(mm)	Hand Auger	(mm)		Push Tube	(mm)	Test Pit	m by m	Other	
Investigation Abandonment	Backfill and Compact - Y / N		Monitoring Well - Y / N	Termination Depth (m)					Termination Reason:		Refusal / Proposed Depth / Instability / Water Ingress / Other:		
Well Construction Details	Well Diameter (mm)		Depth (m)	Screen From (m)		Screen To (m)		Casing From (m)		Casing To (m)		Well Cover:	Gatic / Monument / Other
				Gravel / Sand From (m)		Gravel / Sand To (m)		Bentonite Seal From (m)		Bentonite Seal To (m)			
Additional Comments													

Oil / Water Interface Meter

Instrument Geotech Interface Meter (30M)
Serial No. 4266

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: K. Boardman **Kylie Boardman**

Calibration date: **21/05/2017**

Next calibration due: **20/07/2017**

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 10H100317

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		293215	pH 9.03
1. pH 7.00		pH 7.00		290453	pH 6.72
2. pH 4.00		pH 4.00		288994	pH 4.08
3. mV		231.8mV		OB1388/OB1390	231.9mV
4. EC		2.76mS		292380	2.76mS
5. D.O		0.00ppm		4347	0.00ppm
6. Temp		22.0°C		MultiTherm	21.2°C

Calibrated by: **Joanna Wong**

Calibration date: **23/05/2017**

Next calibration due: **22/06/2017**

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

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.bns@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 :** Nicole Rosen	**PROJECT Number :** 21-25583-13	**Eurofins | mgt quote ID :** GHD Rates 2017/2018
Level 15, 133 Castlereagh Street, Sydney NSW 2000	**Email for results :** terry.nham@ghd.com nicole.rosen@ghd.com	**PROJECT Name :** Albion Park	**Data output format:** ESDAT

Special Directions & Comments :

Eurofins | mgt DI water batch number:

Analytes

	Sample ID	Date	Matrix	PFAS (Full suite)
1	TQA05	25/5/17	Water	X
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

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

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 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:

	1LP	250P	60P	1LA	40mL vial	125mL A	Jar	Bag
1		1	1					

Sample comments:

Relinquished By: Terry Nham - GHD
Date & Time : 26/5/17
Signature:

Laboratory Staff
Received By: Rupam
Date & Time : 29/05 11:41 AM
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: 548034

29 MAY 2017 11:41

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:	Nicole Rosen
Project name:	ALBION PARK
Project ID:	21-25583-13
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	May 29, 2017 11:41 AM
Eurofins | mgt reference:	**548034**

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 : 15.5 degrees Celsius.

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

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

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

☑ Appropriate sample containers have been used.

☑ 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 Nicole Rosen - nicole.rosen@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: **Nicole Rosen**

Report **548034-W**
Project name ALBION PARK
Project ID 21-25583-13
Received Date May 29, 2017

Client Sample ID			**TQA05**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S17-My28782**
Date Sampled			**May 25, 2017**
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)	0.05	ug/L	0.99
Perfluoropentanoic acid (PFPeA)	0.01	ug/L	1.9
Perfluorohexanoic acid (PFHxA)	0.01	ug/L	[N09]6.7
Perfluoroheptanoic acid (PFHpA)	0.01	ug/L	[N09]0.88
Perfluorooctanoic acid (PFOA)	0.01	ug/L	[N09]2.3
Perfluorononanoic acid (PFNA)	0.01	ug/L	[N09]0.07
Perfluorodecanoic acid (PFDA)	0.01	ug/L	[N09]0.02
Perfluoroundecanoic acid (PFUnA)	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoA)	0.01	ug/L	[N09]< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	104
13C5-PFPeA (surr.)	1	%	106
13C5-PFHxA (surr.)	1	%	101
13C4-PFHpA (surr.)	1	%	62
13C8-PFOA (surr.)	1	%	82
13C5-PFNA (surr.)	1	%	55
13C6-PFDA (surr.)	1	%	30
13C2-PFUnDA (surr.)	1	%	41
13C2-PFDoDA (surr.)	1	%	36
13C2-PFTeDA (surr.)	1	%	23
Perfluoroalkane sulfonamides (PFASAs)			
Perfluorooctane sulfonamide (FOSA)	0.05	ug/L	0.20
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	33
D3-N-MeFOSA (surr.)	1	%	34
D5-N-EtFOSA (surr.)	1	%	36
D7-N-MeFOSE (surr.)	1	%	30

Client Sample ID			TQA05
Sample Matrix			Water
Eurofins | mgt Sample No.			S17-My28782
Date Sampled			May 25, 2017
Test/Reference	LOR	Unit	
Perfluoroalkane sulfonamides (PFASAs)			
D9-N-EtFOSE (surr.)	1	%	32
D5-N-EtFOSAA (surr.)	1	%	52
D3-N-MeFOSAA (surr.)	1	%	48
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)	0.01	ug/L	1.5
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	[N09]1.4
Perfluorohexanesulfonic acid (PFHxS)	0.01	ug/L	[N09]9.2
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	[N09]0.78
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]44
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	[N09]0.34
13C3-PFBS (surr.)	1	%	106
18O2-PFHxS (surr.)	1	%	93
13C8-PFOS (surr.)	1	%	47
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.05	ug/L	0.51
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.01	ug/L	0.06
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	70
13C2-6:2 FTS (surr.)	1	%	84
13C2-8:2 FTS (surr.)	1	%	43

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
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Jun 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Jun 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Jun 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Jun 05, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/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	**Order No.:**		**Received:**	May 29, 2017 11:41 AM
Address:	Level 15, 133 Castlereagh Street Sydney NSW 2000	**Report #:**	548034	**Due:**	Jun 5, 2017
		Phone:	02 9239 7100	**Priority:**	5 Day
		Fax:	02 9239 7199	**Contact Name:**	Nicole Rosen
Project Name:	ALBION PARK				
Project ID:	21-25583-13				

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 18217						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	TQA05	May 25, 2017		Water	S17-My28782	X
Test Counts						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. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

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							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	92			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	106			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	90			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	98			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	96			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	99			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	101			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	106			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	106			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	107			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	103			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)	%	106			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	120			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	121			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	112			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	114			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	102			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	97			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	96			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	84			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	109			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	91			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	97			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	89			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	71			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	B17-My27665	NCP	%	110			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B17-My27665	NCP	%	106			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B17-My27665	NCP	%	98			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-My31060	NCP	%	109			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B17-My27665	NCP	%	102			50-150	Pass	
Perfluorononanoic acid (PFNA)	B17-My31060	NCP	%	107			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B17-My31060	NCP	%	109			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-My31060	NCP	%	111			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	B17-My31060	NCP	%	115			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-My31060	NCP	%	114			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-My31060	NCP	%	115			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamides (PFASAs)				Result 1					
Perfluorooctane sulfonamide (FOSA)	B17-My31060	NCP	%	114			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-My31060	NCP	%	123			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-My31060	NCP	%	108			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-My31060	NCP	%	107			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-My31060	NCP	%	119			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-My31060	NCP	%	109			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-My31060	NCP	%	104			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	B17-My27665	NCP	%	99			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-My27665	NCP	%	104			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-My27665	NCP	%	94			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-My31060	NCP	%	114			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-My27665	NCP	%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-My31060	NCP	%	110			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-My31060	NCP	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-My31060	NCP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-My31060	NCP	%	99			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-My31060	NCP	%	75			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M17-My26667	NCP	ug/L	6000	6600	8.0	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-My26667	NCP	ug/L	7500	8000	6.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-My26667	NCP	ug/L	52000	52000	1.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M17-My26667	NCP	ug/L	32000	33000	5.0	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M17-My26667	NCP	ug/L	31000	34000	10	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-My26667	NCP	ug/L	28000	30000	6.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-My26667	NCP	ug/L	190000	210000	9.0	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-My27663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-My29447	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-My29447	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
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.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Nibha Vaidya	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)

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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1712281**	Page	: 1 of 19
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9239 7100	Telephone	: +61-2-8784 8555
Project	: 21-25583-13 Albion Park	Date Samples Received	: 19-May-2017 12:45
Order number	: ----	Date Analysis Commenced	: 22-May-2017
C-O-C number	: ----	Issue Date	: 31-May-2017 13:13
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: SY/143/17		
No. of samples received	: 33		
No. of samples analysed	: 13		

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
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

When 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.

- ****Manual Comment****
- 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.

Analytical Results

Sub-Matrix: ASLP LEACHATE (Matrix: WATER)				Client sample ID	GW06_6.0-6.1	GW07_5.0-5.1	----	----	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-007	ES1712281-017	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.07**	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**6.86**	**0.54**	----	----	----
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		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
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: ASLP LEACHATE (Matrix: WATER)				Client sample ID	GW06_6.0-6.1	GW07_5.0-5.1	----	----	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-007	ES1712281-017	--------	--------	--------
					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		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**6.93**	**0.54**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**6.93**	**0.54**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**6.93**	**0.54**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.3**	**100**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW06_3.0-3.1	GW06_6.0-6.1	TQA01	GW07_3.0-3.1	GW07_5.0-5.1
			Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00
Compound	CAS Number	LOR	Unit	ES1712281-004	ES1712281-007	ES1712281-008	ES1712281-014	ES1712281-017
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	18.4	19.0	18.1	17.4	16.2
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	----	7.6	----	----	7.4
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.10	0.12	----	0.12	0.03
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW06_3.0-3.1	GW06_6.0-6.1	TQA01	GW07_3.0-3.1	GW07_5.0-5.1
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712281-004	ES1712281-007	ES1712281-008	ES1712281-014	ES1712281-017
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**97.9**	**106**	**97.7**	**99.2**	**97.2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW08_2.0-2.1	GW08_5.0-5.1	Trip Blank	WC01	WC02
			Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00
Compound	CAS Number	LOR	Unit	ES1712281-022	ES1712281-025	ES1712281-029	ES1712281-030	ES1712281-031
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	15.4	14.1	2.7	21.7	32.2
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	<5	<5
Cadmium	7440-43-9	1	mg/kg	----	----	----	<1	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	10	12
Copper	7440-50-8	5	mg/kg	----	----	----	13	26
Lead	7439-92-1	5	mg/kg	----	----	----	7	11
Nickel	7440-02-0	2	mg/kg	----	----	----	2	4
Zinc	7440-66-6	5	mg/kg	----	----	----	12	22
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	<0.1	<0.1
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	----	----	6.6	6.3
After HCl pH	----	0.1	pH Unit	----	----	----	1.8	1.8
Extraction Fluid Number	----	1	-	----	----	----	1	1
Final pH	----	0.1	pH Unit	----	----	----	4.9	4.9
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.12	0.03	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	----	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	----	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	----	----	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW08_2.0-2.1	GW08_5.0-5.1	Trip Blank	WC01	WC02
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712281-022	ES1712281-025	ES1712281-029	ES1712281-030	ES1712281-031
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	----	----	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	----	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	----	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	----	----	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	----	----	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		----	----	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg		----	----	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg		----	----	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg		----	----	----	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		----	----	----	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		----	----	----	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		----	----	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		----	----	----	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		----	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	----	----	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		----	----	----	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		----	----	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		----	----	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		----	----	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	----	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		----	----	----	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		----	----	----	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		----	----	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		----	----	----	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW08_2.0-2.1	GW08_5.0-5.1	Trip Blank	WC01	WC02
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712281-022	ES1712281-025	ES1712281-029	ES1712281-030	ES1712281-031
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0029**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0004**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0133**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0006**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW08_2.0-2.1	GW08_5.0-5.1	Trip Blank	WC01	WC02
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712281-022	ES1712281-025	ES1712281-029	ES1712281-030	ES1712281-031
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0180**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0162**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0173**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	----	----	**88.8**	**88.6**
2-Chlorophenol-D4	93951-73-6	0.5	%		----	----	----	**90.9**	**84.8**
2.4.6-Tribromophenol	118-79-6	0.5	%		----	----	----	**74.6**	**102**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	----	----	**103**	**88.6**
Anthracene-d10	1719-06-8	0.5	%		----	----	----	**98.8**	**93.6**
4-Terphenyl-d14	1718-51-0	0.5	%		----	----	----	**110**	**108**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		----	----	----	**83.8**	**91.3**
Toluene-D8	2037-26-5	0.2	%		----	----	----	**79.1**	**87.1**
4-Bromofluorobenzene	460-00-4	0.2	%		----	----	----	**74.8**	**78.8**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**105**	**102**	**112**	**100**	**96.7**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	WC03	WC04	----	----	----
			Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1712281-032	ES1712281-033	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**25.4**	**46.2**	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**16**	**30**	----	----	----
Copper	7440-50-8	5	mg/kg	**23**	**25**	----	----	----
Lead	7439-92-1	5	mg/kg	**12**	**16**	----	----	----
Nickel	7440-02-0	2	mg/kg	**3**	**3**	----	----	----
Zinc	7440-66-6	5	mg/kg	**14**	**10**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.2**	<0.1	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	**5.8**	**5.3**	----	----	----
After HCl pH	----	0.1	pH Unit	**1.9**	**1.8**	----	----	----
Extraction Fluid Number	----	1	-	**1**	**1**	----	----	----
Final pH	----	0.1	pH Unit	**4.9**	**4.9**	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	WC03	WC04	----	----	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-032	ES1712281-033	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0006**	**0.0094**	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0009**	**0.0290**	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0053**	**0.127**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	WC03	WC04	----	----	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-032	ES1712281-033	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		**0.0004**	**0.0238**	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0140**	**0.921**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	**0.0002**	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	**0.009**	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	**0.0121**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0021**	**0.0560**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0004**	**0.0108**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0006**	**0.0275**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	**0.0003**	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	WC03	WC04	----	----	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-032	ES1712281-033	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	**0.0047**	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0243**	**1.23**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0193**	**1.05**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0230**	**1.18**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**86.8**	**82.6**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**85.1**	**83.3**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**87.2**	**85.3**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**97.5**	**86.4**	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**97.0**	**97.9**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**93.4**	**109**	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**80.9**	**84.9**	----	----	----
Toluene-D8	2037-26-5	0.2	%		**79.0**	**74.4**	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**77.0**	**75.5**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**98.1**	**99.7**	----	----	----

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	WC01	WC02	WC03	WC04	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1712281-030	ES1712281-031	ES1712281-032	ES1712281-033	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	**0.03**	**0.65**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	**0.03**	**0.76**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	**0.13**	**0.19**	**6.22**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	**0.74**	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.38**	**0.24**	**20.8**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**0.39**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.07**	**1.35**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	**0.27**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.01**	**0.74**	----
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	<0.02	<0.02	----
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	----

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	WC01	WC02	WC03	WC04	----
				Client sampling date / time	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	18-May-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1712281-030	ES1712281-031	ES1712281-032	ES1712281-033	--------
					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	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	**0.09**	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.51**	**0.57**	**32.0**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.51**	**0.43**	**27.0**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.51**	**0.54**	**30.5**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**101**	**108**	**115**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRB01	----	----	----	----
				Client sampling date / time	18-May-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-028	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	TRB01	----	----	----	----
				Client sampling date / time	18-May-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1712281-028	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	----	----	----	----

Surrogate Control Limits

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

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

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1712281**	Page	: 1 of 24
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9239 7100	Telephone	: +61-2-8784 8555
Project	: 21-25583-13 Albion Park	Date Samples Received	: 19-May-2017
Order number	: ----	Date Analysis Commenced	: 22-May-2017
C-O-C number	: ----	Issue Date	: 31-May-2017
Sampler	: TERRY NHAM		
Site	: ----		
Quote number	: SY/143/17		
No. of samples received	: 33		
No. of samples analysed	: 13		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 905477)									
ES1712269-013	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	84.9	84.8	0.00	0% - 20%
ES1712281-030	WC01	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	21.7	21.0	3.13	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 912327)									
ES1712281-030	WC01	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	9	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	2	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	13	12	11.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	7	8	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	12	14	12.2	No Limit
ES1712599-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	43	43	0.00	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	17	17	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	20	20	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	12	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	34	34	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 912328)									
ES1712281-030	WC01	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1712599-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 913562)									
ES1710723-041	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.16	0.16	0.00	No Limit
ES1712314-003	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.15	0.14	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 900553)									

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: 900553) - continued									
ES1711430-003	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 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: 900552)									
ES1711430-003	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 900856)									
ES1712324-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 900552)									
ES1711430-003	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 900856)									
ES1712324-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 900856)									
ES1712324-001	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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 900856) - continued									
ES1712324-001	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 900064)									
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 907246)									
EP1705279-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0834	0.0761	9.24	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0030	0.0018	47.4	0% - 50%
ES1712281-031	WC02	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0029	0.0028	0.00	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	0.0003	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0133	0.0117	12.6	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: 900064)									
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 907246)									
EP1705279-006	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

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: 907246) - continued									
EP1705279-006	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	<0.0005	<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
ES1712281-031	WC02	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0006	0.0006	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 900064)									
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 907246)									
EP1705279-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 907246) - continued									
EP1705279-006	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1712281-031	WC02	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 900064)									
ES1712281-004	GW06_3.0-3.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 907246)									
EP1705279-006	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	0.0008	<0.0005	46.5	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
ES1712281-031	WC02	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

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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 907246) - continued									
ES1712281-031	WC02	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 900077)									
EB1710185-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 907738)									
ES1712281-030	WC01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 911285)									
EB1710304-015	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.36	1.37	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.48	0.46	2.99	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.03	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
EP1705479-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.57	0.60	4.79	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.17	0.17	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.16	0.16	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.26	1.29	2.74	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.03	0.03	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: 900077)									
EB1710185-008	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

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: 900077) - continued									
EB1710185-008	Anonymous	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: 907738)									
ES1712281-030	WC01	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: 911285)									
EB1710304-015	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.02	0.03	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.08	0.08	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP1705479-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.20	0.19	5.66	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit

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: 911285) - continued									
EP1705479-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 900077)									
EB1710185-008	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: 907738)									
ES1712281-030	WC01	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: 911285)									
EB1710304-015	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

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: 911285) - continued									
EB1710304-015	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1705479-002	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: 900077)									
EB1710185-008	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: 907738)									
ES1712281-030	WC01	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: 911285)									
EB1710304-015	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

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: 911285) - continued									
EB1710304-015	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1705479-002	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: 900077)									
EB1710185-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 907738)									
ES1712281-030	WC01	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 911285)									
EB1710304-015	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.10	2.11	0.475	0% - 20%
EP1705479-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.49	2.54	1.99	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 912327)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	104	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	101	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	100	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	104	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	106	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	107	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	109	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 912328)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	75.6	70	105
EN33: TCLP Leach (QCLot: 904977)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 904978)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 913562)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	100 %	106	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 900553)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	88.9	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	90.8	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.6	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	93.5	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	95.9	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	96.0	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	96.0	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	91.0	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	92.1	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	95.1	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	90.3	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	92.5	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	90.6	70	126

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: 900553) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	96.2	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	89.8	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	90.9	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 900552)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	99.9	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	101	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	101	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 900856)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	86.0	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 900552)								
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	104	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	95.4	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 900856)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	84.6	68	128
EP080: BTEXN (QCLot: 900856)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	82.7	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	85.0	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	77.6	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	79.0	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	75.5	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.3	63	119
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 900064)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.1	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.4	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.8	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.7	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.5	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.5	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 907246)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.4	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.1	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.0	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.2	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.5	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 900064)								

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
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 900064) - continued								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	92.1	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.8	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.9	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.5	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.6	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.2	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.5	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.1	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.1	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.7	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 907246)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	101	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.8	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.0	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.0	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.2	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	128	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	129	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	126	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	70.8	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 900064)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.9	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.9	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.8	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.6	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 907246)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.4	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.8	64	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 907246) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.7	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	66.5	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 900064)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	81.5	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.2	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	98.7	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	76.4	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 907246)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.6	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	115	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	60	130

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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 900077)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	92.4	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	94.8	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	96.8	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	90.8	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 907738)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.6	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	85.4	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	93.0	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	86.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 911285)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	83.4	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	96.0	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 911285) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	99.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	87.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 900077)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	80.7	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	89.2	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	85.4	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	84.0	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	84.6	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	84.2	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	81.8	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	87.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	82.6	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	97.3	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 907738)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	88.3	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	86.4	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	92.8	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	91.2	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	104	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	90.2	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	82.6	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	98.4	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	98.7	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 911285)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	83.6	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	122	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	97.8	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: 911285) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	112	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 900077)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	91.8	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	112	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	99.8	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	95.2	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	90.8	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: 907738)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	86.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	105	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	97.3	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	96.5	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.0	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	81.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 911285)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	80.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	80.2	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	80.2	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	115	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 900077)								

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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 900077) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	100	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	88.2	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	80.6	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	98.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 907738)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	83.0	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	88.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	84.0	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	83.4	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 911285)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	113	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	119	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	110	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	106	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **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: 912327)							
ES1712281-030	WC01	EG005T: Arsenic	7440-38-2	50 mg/kg	88.6	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	102	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	96.5	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	100	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	103	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	99.2	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	103	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 912328)							
ES1712281-030	WC01	EG035T: Mercury	7439-97-6	5 mg/kg	92.2	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 900553)							
ES1711430-003	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	85.3	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	87.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 900552)							
ES1711430-003	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	91.0	73	137

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: 900552) - continued							
ES1711430-003	Anonymous	EP071: C15 - C28 Fraction	----	2319 mg/kg	105	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	112	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 900856)							
ES1712324-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	80.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 900552)							
ES1711430-003	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	93.9	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	107	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	102	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 900856)							
ES1712324-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	80.2	70	130
EP080: BTEXN (QCLot: 900856)							
ES1712324-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	72.6	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	83.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	72.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	71.1	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	74.3	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	89.9	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 900064)							
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	55.2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	54.4	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	63.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	55.5	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	60.6	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	71.0	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 907246)							
EP1705279-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	54.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	76.4	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	68.1	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	74.9	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	64.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 900064)							
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	79.8	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	65.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	76.6	50	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 900064) - continued							
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	67.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	80.3	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	69.1	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	61.3	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	70.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	59.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	50.3	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	84.1	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 907246)							
EP1705279-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	120	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	103	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	76.5	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	93.2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.7	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	84.1	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	122	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	120	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	111	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	104	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	78.4	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 900064)							
ES1712281-004	GW06_3.0-3.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	75.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	65.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	63.2	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	64.4	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	62.8	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	81.1	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	58.2	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 907246)							
EP1705279-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	95.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	107	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	81.1	30	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 907246) - continued							
EP1705279-006	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	79.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	64.7	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	115	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	99.9	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 900064)							
ES1712281-004	GW06_3.0-3.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	68.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	81.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	79.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	74.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 907246)							
EP1705279-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	107	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	92.4	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	114	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	80.9	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 900077)							
EB1710185-008	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	72.8	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	86.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	92.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	86.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	75.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	82.6	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 907738)							
ES1712281-030	WC01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	62.2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	83.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	95.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	92.8	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	89.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	91.2	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 911285)							
EB1710304-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	87.0	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 911285) - continued							
EB1710304-015	Anonymous	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	112	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	102	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	93.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	111	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 900077)							
EB1710185-008	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	77.2	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	81.0	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	107	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	96.4	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	99.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	87.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	86.0	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	86.6	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	78.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	83.2	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	68.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 907738)							
ES1712281-030	WC01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	105	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	111	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	76.8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	93.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	105	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	89.0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	85.4	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	117	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	78.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	90.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	87.3	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 911285)							
EB1710304-015	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	84.4	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	110	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	112	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	106	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	121	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	125	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	121	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	125	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: 911285) - continued							
EB1710304-015	Anonymous	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	91.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	89.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	112	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 900077)							
EB1710185-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	73.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	92.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	91.6	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	86.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	78.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	86.2	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 907738)							
ES1712281-030	WC01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	72.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	87.5	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	90.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	95.7	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	94.7	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	77.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	81.2	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 911285)							
EB1710304-015	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	81.4	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	79.1	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	86.3	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	117	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: 911285) - continued							
EB1710304-015	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	113	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	101	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 900077)							
EB1710185-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	81.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	83.4	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	78.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	72.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 907738)							
ES1712281-030	WC01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	85.4	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	81.2	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	72.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	62.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 911285)							
EB1710304-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	116	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	115	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	113	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	94.2	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1712281**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Telephone	: +61-2-8784 8555
Project	: 21-25583-13 Albion Park	Date Samples Received	: 19-May-2017
Site	: ----	Issue Date	: 31-May-2017
Sampler	: TERRY NHAM	No. of samples received	: 33
Order number	: ----	No. of samples analysed	: 13

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: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP1705279--006	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
EA055: Moisture Content							
HDPE Soil Jar (EA055-103)							
GW06_6.0-6.1, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**----**	----	----	**24-May-2017**	01-Jun-2017	✓
Soil Glass Jar - Unpreserved (EA055-103)							
GW06_3.0-3.1, TQA01, Trip Blank, WC01, WC02, WC03, WC04	**18-May-2017**	**----**	----	----	**24-May-2017**	01-Jun-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
WC01, WC02, WC03, WC04	**18-May-2017**	**27-May-2017**	14-Nov-2017	✓	**29-May-2017**	14-Nov-2017	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
WC01, WC02, WC03, WC04	**18-May-2017**	**27-May-2017**	15-Jun-2017	✓	**29-May-2017**	15-Jun-2017	✓
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)							
WC01, WC02, WC03, WC04	**18-May-2017**	**24-May-2017**	01-Jun-2017	✓	**----**	----	----

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN60: Bottle Leaching Procedure							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-Dla)							
GW06_6.0-6.1, GW07_5.0-5.1	**18-May-2017**	**25-May-2017**	01-Jun-2017	✓	**----**	----	----
EP003: Total Organic Carbon (TOC) in Soil							
Soil Glass Jar - Unpreserved (EP003)							
GW06_3.0-3.1, GW06_6.0-6.1, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**29-May-2017**	15-Jun-2017	✓	**29-May-2017**	15-Jun-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
WC01, WC02, WC03, WC04	**18-May-2017**	**22-May-2017**	01-Jun-2017	✓	**23-May-2017**	01-Jul-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
WC01, WC02, WC03, WC04	**18-May-2017**	**22-May-2017**	01-Jun-2017	✓	**22-May-2017**	01-Jun-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
WC01, WC02, WC03, WC04	**18-May-2017**	**22-May-2017**	01-Jun-2017	✓	**23-May-2017**	01-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
WC01, WC02, WC03, WC04	**18-May-2017**	**22-May-2017**	01-Jun-2017	✓	**22-May-2017**	01-Jun-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
WC01, WC02, WC03, WC04	**18-May-2017**	**22-May-2017**	01-Jun-2017	✓	**23-May-2017**	01-Jul-2017	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
WC01, WC02, WC03, WC04	**18-May-2017**	**22-May-2017**	01-Jun-2017	✓	**22-May-2017**	01-Jun-2017	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
GW06_3.0-3.1, GW06_6.0-6.1, TQA01, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
HDPE Soil Jar (EP231X)							
WC01, WC02, WC03, WC04	**18-May-2017**	**26-May-2017**	14-Nov-2017	✓	**26-May-2017**	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
GW06_3.0-3.1, GW06_6.0-6.1, TQA01, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
HDPE Soil Jar (EP231X)							
WC01, WC02, WC03, WC04	**18-May-2017**	**26-May-2017**	14-Nov-2017	✓	**26-May-2017**	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
GW06_3.0-3.1, GW06_6.0-6.1, TQA01, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
HDPE Soil Jar (EP231X)							
WC01, WC02, WC03, WC04	**18-May-2017**	**26-May-2017**	14-Nov-2017	✓	**26-May-2017**	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
GW06_3.0-3.1, GW06_6.0-6.1, TQA01, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
HDPE Soil Jar (EP231X)							
WC01, WC02, WC03, WC04	**18-May-2017**	**26-May-2017**	14-Nov-2017	✓	**26-May-2017**	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-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) GW06_3.0-3.1, GW06_6.0-6.1, TQA01, GW07_3.0-3.1, GW07_5.0-5.1, GW08_2.0-2.1, GW08_5.0-5.1	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-Jul-2017	✓
HDPE Soil Jar (EP231X) WC01, WC02, WC03, WC04	**18-May-2017**	**26-May-2017**	14-Nov-2017	✓	**26-May-2017**	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X) Trip Blank	**18-May-2017**	**23-May-2017**	14-Nov-2017	✓	**23-May-2017**	02-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
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) TRB01	**18-May-2017**	**----**	----	----	**22-May-2017**	14-Nov-2017	✓
HDPE (no PTFE) (EP231X) WC01, WC02, WC03, WC04	**24-May-2017**	**----**	----	----	**26-May-2017**	20-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW06_6.0-6.1, GW07_5.0-5.1	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) TRB01	**18-May-2017**	**----**	----	----	**22-May-2017**	14-Nov-2017	✓
HDPE (no PTFE) (EP231X) WC01, WC02, WC03, WC04	**24-May-2017**	**----**	----	----	**26-May-2017**	20-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW06_6.0-6.1, GW07_5.0-5.1	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) TRB01	**18-May-2017**	**----**	----	----	**22-May-2017**	14-Nov-2017	✓
HDPE (no PTFE) (EP231X) WC01, WC02, WC03, WC04	**24-May-2017**	**----**	----	----	**26-May-2017**	20-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW06_6.0-6.1, GW07_5.0-5.1	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) TRB01	**18-May-2017**	**----**	----	----	**22-May-2017**	14-Nov-2017	✓
HDPE (no PTFE) (EP231X) WC01, WC02, WC03, WC04	**24-May-2017**	**----**	----	----	**26-May-2017**	20-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW06_6.0-6.1, GW07_5.0-5.1	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) TRB01	**18-May-2017**	**----**	----	----	**22-May-2017**	14-Nov-2017	✓
HDPE (no PTFE) (EP231X) WC01, WC02, WC03, WC04	**24-May-2017**	**----**	----	----	**26-May-2017**	20-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW06_6.0-6.1, GW07_5.0-5.1	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-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)							
Moisture Content	EA055-103	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TCLP for Non & Semivolatile Analytes	EN33a	2	14	**14.29**	**9.09**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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).
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)
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
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.
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
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Deionised Water Leach	EN60-Dla	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
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)

Preparation Methods	Method	Matrix	Method Descriptions
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1712870**	Page	: 1 of 23
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9239 7100	Telephone	: +61-2-8784 8555
Project	: 21-25583-13 Albion Park	Date Samples Received	: 26-May-2017 16:00
Order number	: ----	Date Analysis Commenced	: 29-May-2017
C-O-C number	: ----	Issue Date	: 06-Jun-2017 13:48
Sampler	: Terry Nham		
Site	: ----		
Quote number	: SY/143/17		
No. of samples received	: 32		
No. of samples analysed	: 32		

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
Andrew Epps	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: ASLP LEACHATE (Matrix: WATER)				Client sample ID	SS01	SS05	SS08	SS02	SS03
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-013	ES1712870-014	ES1712870-015	ES1712870-024	ES1712870-025
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	**0.07**	<0.02	<0.02	**0.05**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	**0.04**	<0.02	<0.02	**0.04**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.10**	**0.34**	<0.02	<0.02	**0.30**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	**0.02**	<0.02	<0.02	**0.02**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**2.84**	**12.0**	**0.11**	<0.01	**0.83**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		**0.02**	**0.35**	<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	**0.7**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.03**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.39**	<0.02	<0.02	**0.07**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.03**	<0.02	<0.02	**0.02**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.01**	**0.14**	<0.01	<0.01	**0.03**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	**0.25**	<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: ASLP LEACHATE (Matrix: WATER)				Client sample ID	SS01	SS05	SS08	SS02	SS03
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-013	ES1712870-014	ES1712870-015	ES1712870-024	ES1712870-025
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**2.97**	**13.7**	**0.11**	<0.01	**2.06**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**2.94**	**12.3**	**0.11**	<0.01	**1.13**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**2.95**	**13.0**	**0.11**	<0.01	**2.00**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	**96.9**	**96.8**	**101**	**96.1**

Analytical Results

Sub-Matrix: ASLP LEACHATE (Matrix: WATER)				Client sample ID	SS04	SS06	SS07	SS09	----
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1712870-026	ES1712870-027	ES1712870-028	ES1712870-029	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.03**	**0.01**	**0.03**	**0.48**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
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	<0.02	<0.02	----
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	----

Analytical Results

Sub-Matrix: ASLP LEACHATE (Matrix: WATER)				Client sample ID	SS04	SS06	SS07	SS09	----
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1712870-026	ES1712870-027	ES1712870-028	ES1712870-029	--------
					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	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
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		**0.03**	**0.01**	**0.03**	**0.48**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**0.01**	**0.03**	**0.48**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	**0.01**	**0.03**	**0.48**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.4**	**95.4**	**99.0**	**97.6**	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS01	SS05	SS08	TQA06	SS02
			Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit	ES1712870-013	ES1712870-014	ES1712870-015	ES1712870-016	ES1712870-024
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**51.3**	**34.8**	**46.8**	**29.2**	**28.1**
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**6.5**	**6.4**	**7.6**	**----**	**7.8**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**3.85**	**0.33**	**2.62**	**----**	**0.42**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	**0.0003**	<0.0002	**0.0002**	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0002**	**0.0004**	<0.0002	**0.0003**	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0016**	**0.0039**	<0.0002	**0.0022**	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0002**	**0.0005**	<0.0002	**0.0003**	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0393**	**0.263**	**0.0050**	**0.101**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	**0.0014**	**0.0080**	<0.0002	**0.0044**	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0005**	**0.0029**	<0.0002	**0.0020**	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	**0.0003**	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0002**	**0.0016**	<0.0002	**0.0009**	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	**0.0003**	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS01	SS05	SS08	TQA06	SS02
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-013	ES1712870-014	ES1712870-015	ES1712870-016	ES1712870-024
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		**0.0007**	**0.0118**	<0.0002	**0.0031**	<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	**0.0006**	<0.0002	**0.0004**	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	**0.0003**	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	**0.0008**	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0441**	**0.294**	**0.0053**	**0.115**	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0409**	**0.267**	**0.0050**	**0.103**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0416**	**0.273**	**0.0050**	**0.106**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**101**	**96.9**	**116**	**112**	**108**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS03	SS04	SS06	SS07	SS09
			Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit	ES1712870-025	ES1712870-026	ES1712870-027	ES1712870-028	ES1712870-029
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**67.3**	**32.0**	**31.5**	**34.1**	**36.0**
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**6.8**	**8.3**	**8.2**	**7.6**	**7.4**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**13.3**	**0.14**	**0.88**	**2.92**	**0.30**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0012**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0020**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0142**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0015**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0843**	**0.0007**	<0.0002	**0.0010**	**0.0202**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0030**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0008**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0015**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0006**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS03	SS04	SS06	SS07	SS09
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-025	ES1712870-026	ES1712870-027	ES1712870-028	ES1712870-029
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.109**	**0.0007**	<0.0002	**0.0010**	**0.0210**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0985**	**0.0007**	<0.0002	**0.0010**	**0.0202**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.105**	**0.0007**	<0.0002	**0.0010**	**0.0202**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**101**	**109**	**108**	**106**	**112**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Trip Blank	----	----	----	----
				Client sampling date / time	25-May-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1712870-031	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Trip Blank	----	----	----	----
				Client sampling date / time	25-May-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1712870-031	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**108**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW01	GW02	GW03	GW04	GW05
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-001	ES1712870-002	ES1712870-003	ES1712870-004	ES1712870-005
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**4430**	**2980**	**3220**	**4530**	**6210**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.26**	**2.76**	**47.0**	**0.03**	**0.05**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.21**	**2.37**	**44.0**	<0.02	**0.03**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**1.10**	**15.4**	**200**	**0.08**	**0.04**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.08**	**0.21**	**6.31**	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.35**	**3.56**	**20.0**	**0.03**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**5.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.18**	**11.4**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.13**	**0.69**	**50.0**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.07**	**4.85**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.03**	**0.13**	**7.21**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW01	GW02	GW03	GW04	GW05
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-001	ES1712870-002	ES1712870-003	ES1712870-004	ES1712870-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**0.51**
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**2.52**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**2.16**	**25.4**	**398**	**0.14**	**0.65**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**1.45**	**19.0**	**220**	**0.11**	**0.06**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**1.87**	**22.8**	**348**	**0.14**	**0.11**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**80.2**	**81.7**	**72.1**	**79.6**	**79.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW06	GW07	GW08	TQA04	SW01
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-006	ES1712870-007	ES1712870-008	ES1712870-009	ES1712870-010
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**1840**	**6400**	**4610**	**----**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**----**	**----**	**----**	**394**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	**2.73**	**0.16**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	**2.38**	**0.15**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	**16.0**	**0.82**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	**0.22**	**0.05**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**3.66**	**1.63**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**0.18**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**0.64**	**0.14**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	**0.08**	**0.02**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.13**	**0.04**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW06	GW07	GW08	TQA04	SW01
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-006	ES1712870-007	ES1712870-008	ES1712870-009	ES1712870-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	**26.0**	**3.01**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**19.7**	**2.45**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	**23.4**	**2.81**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**84.2**	**84.4**	**80.8**	**78.9**	**79.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW05	SW08	TRB02	SW02	SW03
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-011	ES1712870-012	ES1712870-017	ES1712870-018	ES1712870-019
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**12**	**706**	----	**7**	**408**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	**112**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	**112**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**1.74**	<0.02	<0.02	<0.02	**0.07**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**1.74**	<0.02	<0.02	<0.02	**0.06**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**11.3**	<0.02	<0.02	<0.02	**0.36**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.74**	<0.02	<0.02	<0.02	**0.03**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**32.8**	**0.06**	<0.01	<0.01	**0.91**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		**0.11**	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.8**	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.88**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**4.36**	<0.02	<0.02	<0.02	**0.05**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.65**	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.86**	<0.01	<0.01	<0.01	**0.02**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.04**	<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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW05	SW08	TRB02	SW02	SW03
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-011	ES1712870-012	ES1712870-017	ES1712870-018	ES1712870-019
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		**0.24**	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**0.05**
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**1.30**	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.09**	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**58.6**	**0.06**	<0.01	<0.01	**1.55**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**44.1**	**0.06**	<0.01	<0.01	**1.27**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**55.8**	**0.06**	<0.01	<0.01	**1.41**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**77.6**	**74.5**	**87.7**	**82.8**	**80.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW04	SW06	SW07	SW09	TRB03
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-020	ES1712870-021	ES1712870-022	ES1712870-023	ES1712870-030
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	**26**	**10600**	**14**	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	**29**	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	**98**	**163**	**106**	----
Total Alkalinity as CaCO3	----	1	mg/L		----	**127**	**163**	**106**	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	**0.09**	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.06**	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW04	SW06	SW07	SW09	TRB03
				Client sampling date / time	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00	25-May-2017 00:00
Compound	CAS Number	LOR	Unit		ES1712870-020	ES1712870-021	ES1712870-022	ES1712870-023	ES1712870-030
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.15**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.15**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.15**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**74.1**	**86.8**	**85.2**	**78.0**	**82.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip Blank	----	----	----	----
				Client sampling date / time	25-May-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1712870-032	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip Blank	----	----	----	----
				Client sampling date / time	25-May-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1712870-032	--------	--------	--------	--------	
				Result	----	----	----	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	----	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----	
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	**105**	----	----	----	----	

Surrogate Control Limits

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

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

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1712870**	Page	: 1 of 23
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9239 7100	Telephone	: +61-2-8784 8555
Project	: 21-25583-13 Albion Park	Date Samples Received	: 26-May-2017
Order number	: ----	Date Analysis Commenced	: 29-May-2017
C-O-C number	: ----	Issue Date	: 06-Jun-2017
Sampler	: Terry Nham		
Site	: ----		
Quote number	: SY/143/17		
No. of samples received	: 32		
No. of samples analysed	: 32		

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
Andrew Epps	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 915976)									
ES1712837-052	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	5.4	6.0	10.2	No Limit
ES1712837-064	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	24.0	23.6	1.62	0% - 20%
EA055: Moisture Content (QC Lot: 915977)									
ES1712870-024	SS02	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	28.1	32.4	14.0	0% - 20%
ES1712947-006	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	10.7	10.0	6.47	0% - 50%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 926347)									
EB1710916-011	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.57	0.57	0.00	0% - 20%
ES1712870-014	SS05	EP003: Total Organic Carbon	----	0.02	%	0.33	0.35	6.16	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 913066)									
EM1706684-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0068	0.0078	14.7	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES1712870-016	TQA06	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0022	0.0024	9.95	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0003	0.0004	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.101	0.112	9.69	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0044	0.0047	6.15	0% - 20%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 913066)									
EM1706684-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

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: 913066) - continued									
EM1706684-001	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
ES1712870-016	TQA06	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	0.0020	0.0021	7.20	0% - 50%
		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	0.0009	0.0011	22.5	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: 913066)									
EM1706684-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1712870-016	TQA06	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0031	0.0038	20.4	0% - 50%
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	0.0004	0.0004	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

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: 913066) - continued									
ES1712870-016	TQA06	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 913066)									
EM1706684-001	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
ES1712870-016	TQA06	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 (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 916480)									
ES1712856-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	5880	5910	0.577	0% - 20%
ES1712870-003	GW03	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3220	2850	12.0	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 915889)									
ES1712812-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	402	370	8.28	0% - 20%
ES1712860-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	6	17.5	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 915890)									
ES1712870-020	SW04	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	8	51.8	No Limit
ES1712889-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	10	11	11.8	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 914066)									
ES1712910-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	52	55	4.70	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	52	55	4.70	0% - 20%
ES1712910-013	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	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 (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 914066) - continued									
ES1712910-013	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	64	61	4.81	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	64	61	4.81	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 913076)									
ES1712870-001	GW01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.35	0.35	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.26	0.25	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.21	0.21	0.00	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.10	1.14	4.20	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.08	0.07	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1712870-011	SW05	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	32.8	32.4	1.10	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.74	1.72	0.810	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.74	1.69	3.09	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	11.3	11.0	2.18	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.74	0.72	3.70	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.11	0.11	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 913080)									
ES1712870-032	Trip Blank	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1712965-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2.42	2.53	4.64	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.18	0.20	7.92	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.81	0.81	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	0.07	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: 921457)									
EB1711109-011	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 925741)									
ES1712870-015	SS08	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.11	0.12	0.00	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 925741) - continued									
ES1712870-015	SS08	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
ES1713572-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 913076)									
ES1712870-001	GW01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.13	0.12	8.76	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
ES1712870-011	SW05	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.86	1.84	0.810	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.88	0.77	13.0	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	4.36	4.29	1.73	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.65	0.61	5.71	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.04	0.03	31.6	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	0.8	0.9	16.5	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 913080)									
ES1712870-032	Trip Blank	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

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: 913080) - continued									
ES1712870-032	Trip Blank	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
ES1712965-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.14	0.14	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.31	0.32	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 921457)									
EB1711109-011	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: 925741)									
ES1712870-015	SS08	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

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: 925741) - continued									
ES1713572-003	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 913076)									
ES1712870-001	GW01	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
ES1712870-011	SW05	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.24	0.29	16.8	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 913080)									
ES1712870-032	Trip Blank	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 913080) - continued									
ES1712870-032	Trip Blank	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
ES1712965-002	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: 921457)									
EB1711109-011	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: 925741)									
ES1712870-015	SS08	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 925741) - continued									
ES1712870-015	SS08	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
ES1713572-003	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
		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: 913076)									
ES1712870-001	GW01	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
ES1712870-011	SW05	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	1.30	1.32	1.60	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.09	0.12	23.1	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: 913076) - continued									
ES1712870-011	SW05	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: 913080)									
ES1712870-032	Trip Blank	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
ES1712965-002	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	0.06	<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: 921457)									
EB1711109-011	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: 925741)									
ES1712870-015	SS08	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1713572-003	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: 925741) - continued									
ES1713572-003	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
EP231P: PFAS Sums (QC Lot: 913076)									
ES1712870-001	GW01	EP231X: Sum of PFAS	----	0.01	µg/L	2.16	2.16	0.00	0% - 20%
ES1712870-011	SW05	EP231X: Sum of PFAS	----	0.01	µg/L	58.6	57.8	1.44	0% - 20%
EP231P: PFAS Sums (QC Lot: 913080)									
ES1712870-032	Trip Blank	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1712965-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	4.19	4.28	2.12	0% - 20%
EP231P: PFAS Sums (QC Lot: 921457)									
EB1711109-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 925741)									
ES1712870-015	SS08	EP231X: Sum of PFAS	----	0.01	µg/L	0.11	0.12	8.70	0% - 50%
ES1713572-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 926347)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	100 %	98.3	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 913066)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	59.8	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	67.0	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.3	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	60.8	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.6	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 913066)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	83.0	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.6	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.1	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	127	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.3	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913066)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.8	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	119	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	104	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.1	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	65.0	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913066)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	69.2	54	130

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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913066) - continued								
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	71.7	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	112	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	123	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: 916480)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	87	109
				<10	293 mg/L	97.6	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 915889)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	100	83	129
				<5	1000 mg/L	97.0	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 915890)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	116	83	129
				<5	1000 mg/L	95.3	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 914066)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	92.4	81	111
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 913076)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	80.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	99.2	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	90.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	95.6	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 913080)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	74.8	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	89.8	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	89.2	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	78.6	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	94.0	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 921457)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	92.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	93.0	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	91.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	106	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	110	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 925741)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	95.2	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	105	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 913076)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	101	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	70.4	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	95.4	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	115	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	77.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	90.1	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 913080)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	92.8	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	90.2	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	89.8	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	78.2	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	86.6	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	80.0	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	81.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	76.9	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 921457)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	95.1	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	95.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	103	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	117	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: 921457) - continued								
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	108	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	97.8	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 925741)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	91.8	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	108	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	97.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	124	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	115	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913076)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	94.1	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	102	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	94.7	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	91.2	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913080)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	72.8	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	86.3	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	108	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	73.4	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	93.7	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	87.0	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913080) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	74.6	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 921457)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	84.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	97.3	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	93.4	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	101	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.5	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 925741)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	121	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	108	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	120	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	116	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	116	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913076)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	99.4	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	104	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	86.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913080)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	87.6	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	84.8	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	93.4	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	80.4	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 921457)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	85.8	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

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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 921457) - continued								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	97.4	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	79.0	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 925741)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	101	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	106	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	112	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	98.0	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 913066)							
EM1706684-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	54.7	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.3	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	104	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	98.0	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	75.1	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 913066)							
EM1706684-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	97.9	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	93.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	110	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	115	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	122	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	123	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	104	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	97.9	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	108	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	114	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	84.5	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913066)							
EM1706684-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	87.1	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913066) - continued							
EM1706684-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	93.7	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	105	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	97.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	80.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	122	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	112	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913066)							
EM1706684-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	109	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	123	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	128	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	123	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 913076)							
ES1712870-001	GW01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	60.4	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	81.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	76.0	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	79.6	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	68.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	86.0	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 913080)							
ES1712870-032	Trip Blank	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	71.0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	81.0	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	79.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	75.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	67.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	85.0	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 921457)							
EB1711109-011	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	89.8	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	87.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	92.4	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 921457) - continued							
EB1711109-011	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	100	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	99.8	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 925741)							
ES1712870-015	SS08	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	95.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	106	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	117	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	97.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	102	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	111	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 913076)							
ES1712870-001	GW01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	65.7	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	54.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	63.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	87.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	85.4	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	95.0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	74.0	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	75.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	93.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	73.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	59.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 913080)							
ES1712870-032	Trip Blank	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	90.0	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	83.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	80.0	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	76.4	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	82.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	74.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	77.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	74.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	79.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	87.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	76.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 921457)							
EB1711109-011	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	89.0	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	69.0	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	92.0	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	93.0	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: 921457) - continued							
EB1711109-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	101	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	110	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	109	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	109	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	106	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	119	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	94.3	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 925741)							
ES1712870-015	SS08	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	76.7	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	94.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	112	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	97.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	110	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	111	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	112	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	107	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	97.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	120	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	114	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913076)							
ES1712870-001	GW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	96.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	77.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	70.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	82.7	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	106	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	76.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	88.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 913080)							
ES1712870-032	Trip Blank	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	66.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	69.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	91.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	68.6	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: 913080) - continued							
ES1712870-032	Trip Blank	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	78.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	70.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	69.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 921457)							
EB1711109-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	94.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	110	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	110	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	97.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	101	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	87.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	98.4	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 925741)							
ES1712870-015	SS08	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	110	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	109	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	114	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	90.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	108	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913076)							
ES1712870-001	GW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	92.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	102	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	124	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	108	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 913080)							
ES1712870-032	Trip Blank	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	76.8	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: 913080) - continued							
ES1712870-032	Trip Blank	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	68.2	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	85.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	61.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 921457)							
EB1711109-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	88.0	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	94.4	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	74.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 925741)							
ES1712870-015	SS08	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	106	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	108	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	98.8	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1712870**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Telephone	: +61-2-8784 8555
Project	: 21-25583-13 Albion Park	Date Samples Received	: 26-May-2017
Site	: ----	Issue Date	: 06-Jun-2017
Sampler	: Terry Nham	No. of samples received	: 32
Order number	: ----	No. of samples analysed	: 32

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: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EM1706684--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.**

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
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
SS01, SS05, SS08, TQA06, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**----**	----	----	**30-May-2017**	08-Jun-2017	✓
EN60: Bottle Leaching Procedure							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-Dla)							
SS08, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**01-Jun-2017**	08-Jun-2017	✓	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-Dla)							
SS01, SS05	**25-May-2017**	**31-May-2017**	08-Jun-2017	✓	**----**	----	----
EP003: Total Organic Carbon (TOC) in Soil							
Pulp Bag (EP003)							
SS01, SS05, SS08, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**05-Jun-2017**	22-Jun-2017	✓	**05-Jun-2017**	22-Jun-2017	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SS01, SS05, SS08, TQA06, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
SS01, SS05, SS08, TQA06, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
SS01, SS05, SS08, TQA06, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SS01, SS05, SS08, TQA06, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-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)							
SS01, SS05, SS08, TQA06, SS02, SS03, SS04, SS06, SS07, SS09	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
Trip Blank	**25-May-2017**	**29-May-2017**	21-Nov-2017	✓	**29-May-2017**	08-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
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
GW01, GW02, GW03, GW04, GW05, GW06, GW07, GW08	**25-May-2017**	**----**	----	----	**30-May-2017**	01-Jun-2017	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
TQA04, SW05, SW08, SW02, SW03, SW04, SW06, SW07, SW09	**25-May-2017**	**----**	----	----	**30-May-2017**	01-Jun-2017	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
SW08, SW06, SW07, SW09	**25-May-2017**	**----**	----	----	**29-May-2017**	08-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) SS08, SS02, SS03, SS04, SS06, SS07, SS09	**01-Jun-2017**	**----**	----	----	**05-Jun-2017**	28-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW01, GW02, GW03, GW04, GW05, GW06, GW07, GW08, TQA04, SW01, SW05, SW08, TRB02, SW02, SW03, SW04, SW06, SW07, SW09, TRB03, Trip Blank	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
HDPE (no PTFE) (EP231X) SS01, SS05	**31-May-2017**	**----**	----	----	**02-Jun-2017**	27-Nov-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SS08, SS02, SS03, SS04, SS06, SS07, SS09	**01-Jun-2017**	**----**	----	----	**05-Jun-2017**	28-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW01, GW02, GW03, GW04, GW05, GW06, GW07, GW08, TQA04, SW01, SW05, SW08, TRB02, SW02, SW03, SW04, SW06, SW07, SW09, TRB03, Trip Blank	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
HDPE (no PTFE) (EP231X) SS01, SS05	**31-May-2017**	**----**	----	----	**02-Jun-2017**	27-Nov-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SS08, SS02, SS03, SS04, SS06, SS07, SS09	**01-Jun-2017**	**----**	----	----	**05-Jun-2017**	28-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW01, GW02, GW03, GW04, GW05, GW06, GW07, GW08, TQA04, SW01, SW05, SW08, TRB02, SW02, SW03, SW04, SW06, SW07, SW09, TRB03, Trip Blank	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
HDPE (no PTFE) (EP231X) SS01, SS05	**31-May-2017**	**----**	----	----	**02-Jun-2017**	27-Nov-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SS08, SS02, SS03, SS04, SS06, SS07, SS09	**01-Jun-2017**	**----**	----	----	**05-Jun-2017**	28-Nov-2017	✓
HDPE (no PTFE) (EP231X) GW01, GW02, GW03, GW04, GW05, GW06, GW07, GW08, TQA04, SW01, SW05, SW08, TRB02, SW02, SW03, SW04, SW06, SW07, SW09, TRB03, Trip Blank	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
HDPE (no PTFE) (EP231X) SS01, SS05	**31-May-2017**	**----**	----	----	**02-Jun-2017**	27-Nov-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SS08, SS02, SS03, SS04, SS06, SS07, SS09	**01-Jun-2017**	**----**	----	----	**05-Jun-2017**	28-Nov-2017	✓
HDPE (no PTFE) (EP231X)							
GW01, GW02, GW03, GW04, GW05, GW06, GW07, GW08, TQA04, SW01, SW05, SW08, TRB02, SW02, SW03, SW04, SW06, SW07, SW09, TRB03, Trip Blank	**25-May-2017**	**----**	----	----	**29-May-2017**	21-Nov-2017	✓
HDPE (no PTFE) (EP231X)							
SS01, SS05	**31-May-2017**	**----**	----	----	**02-Jun-2017**	27-Nov-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)							
Moisture Content	EA055-103	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**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
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	7	54	**12.96**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	**12.50**	**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
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	54	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	54	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	54	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . 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)
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
Deionised Water Leach	EN60-Dla	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

Appendix H – Survey Report

Pot Hole No.	Easting	Northing	Pipe RL	Surface RL
GW06	297427.528	6173717.756	4.436	4.531
GW07	297484.677	6173648.639	4.692	4.774
GW08	297743.275	6173909.756	2.384	2.482

Appendix I – Waste Disposal

NSW Environment Protection Authority - Online Waste Tracking System

TRANSPORT CERTIFICATE - No. 2T00804744

Created by : David Johnston 20-Jun-2017 3:49 pm **Status:** Processed

CA no: 2C00132008 **CA start date:**20-Jun-2017 **CA end date:** 31-Dec-2017

PART 1 (this part to be completed by consignor at pickup)

CONSIGNOR

FIRE AND RESCUE
AIRPORT RD
ALBION PARK, NSW 2527

Role: Producer
Contact: THOMAS PELOSO **Email:** N/A
Phone: 0422 172709 **Fax:** N/A **Emergency:** 0422 172709
ABN: 12 593 473 110 **ANZSIC code:** 0 **Licence no.:** N/A

Pickup details: As above

WASTE

See attachment for details of additional wastes transported under this TC

Waste code: J120 - Waste oil/hydrocarbons mixtures/emulsions in water
Description: Oil/hydrocarbon mixed with water nos
Form: Liquid **Liquid waste levy applies:** No
Proposed treatment: Storage **Classification:** Liquid
Contaminants: N/A
Dangerous goods class: N/A **Subsidiary risk class:** N/A **UN no.:** N/A
Packaging type: N/A **Packing group no:** N/A **No. package:** N/A

Waste amount at pick up: 101.00 kg (required - Yes)
Waste amount at arrival: 101.00 kg Processing treatment: Storage

PICKUP

Pick-up date: 21-Jun-2017 **Intended delivery date:** 21-Jun-2017

PART 2 - TRANSPORTER (this part to be completed by the transporter at pickup)

ENVIRONMENTAL TREATMENT SOLUTIONS (TRANSPORTER)
7 PEMBURY ROAD
MINTO, NSW 2566

Contact: JOCK GERMANY **Email:** jock@envirotreat.com.au
Phone: (02) 9603 3666 **Fax :** (02) 8078 0197 **Transit state:** N/A
Licence no.: 13157 **Vehicle reg:** TBA **Transport type:** Road

PART 3 - RECEIVING FACILITY (this part to be completed by the receiving facility)

ENVIRONMENTAL TREATMENT SOLUTIONS PTY LTD - MINTO
WAREHOUSE B, 7 PEMBURY ROAD
MINTO, NSW 2566

Contact: JOCK GERMANY **Email:** jock@envirotreat.com.au
Phone: (02) 9605 8543 **Fax:**
Licence no.: 20696

Receiving facility ref no.: N/A
Arrival date: 21-Jun-2017 **Did paper TC accompany load?** Yes
Acceptance date: 30-Jun-2017
Processing date: 30-Jun-2017

NOTE

NOTE: The Protection of the Environment Operations (Waste) Regulation 2014 ("the Regulation") requires that an approved transport certificate accompany certain wastes when transported into, out of or within NSW. This transport certificate is in the approved form and meets the requirements of the Regulation provided that:

(a) the consignor certifies, by signing this certificate, that the information in Part 1 of the certificate is correct;
(b) the transporter certifies, by signing the certificate, that the information in Part 2 of the certificate is correct; and
(c) the receiving facility (receiver) certifies, by signing this certificate, that the information in Part 3 of the certificate is correct; and
(d) the receiving facility records any discrepancies between the waste received and the information recorded on this certificate in the EPA online waste tracking system.

If any of the information in Parts 1 and 2 of the certificate is not correct and it is not practical at the time to change the information in the EPA online tracking system and print a new version of the certificate, the consignor or transporter must write and initial any corrections on the certificate. The receiving facility must ensure these corrections are entered into the EPA online system as soon as is practicable afterwards.

The receiving facility must retain this certificate for four years.

ADDITIONAL WASTES

This consignment authorisation permits the wastes described below to be transported provided the consignor, transporter and receiving facility comply with the conditions of this approval and the Protection of the Environment Operations (Waste) Regulation 2005.

Waste code: N120 - Soils contaminated with a controlled waste
Description: Contaminated soil
Form: Solid
Proposed treatment: Storage
Classification: Hazardous
Contaminants: N/A
Dangerous goods class: N/A
Subsidiary risk class: N/A
UN no.: N/A
Packaging type: N/A
Packing group no: N/A
No. package: N/A
Waste amount at pickup: 719.00 kg
Waste amount at arrival: 719.00 kg
Processing treatment: Storage

GHD

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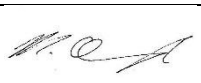
Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	N. Rosen	J. Hallchurch		M. Clough		20/10/2017

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