Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Airservices Australia

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Abbreviations

ADWG	Australian Drinking Water Guidelines
AFFF	Aqueous film forming foam
AHD	Australian height datum
ANZECC	Australia New Zealand Environment and Conservation Council
ANZG	Australia and New Zealand Guidelines
ASC NEPM	Assessment of Site Contamination National Environment Protection Measure 1999 (as amended 2013)
ASLP	Australian standard leaching potential
ARFF	Aviation rescue and fire fighting
ARFFS	Aviation Rescue Fire Fighting Services
BTEXN	Benzene, toluene, ethylbenzene, xylenes and naphthalene
COPC	Contaminants of potential concern
CSM	Conceptual site model
DGV	Default guideline values
DO	Dissolved Oxygen
DoEE	Department of Energy and Environment
DoH	Department of Health
DQOs	Data quality objectives
EC	Electrical Conductivity
EPP	Environmental Protection Policy
FSANZ	Food Standards Australia and New Zealand
FTG	Firefighting training ground
GIL	Groundwater investigation levels
GME	Groundwater monitoring event
GV- high	Guideline values- high
HEPA	Heads of Environmental Protection Agencies Australia and New Zealand
HDPE	High density polyethylene
HIL	Health investigation levels
IL	Investigation level
JUHI	Joint users hydrant installation
LMU	Large mock up
LOR	Limits of reporting
MAH	Mono aromatic hydrocarbons
mbgl	Metres below ground level
mbtoc	Metres below top of casing
NATA	National Association of Testing Authorities

NDD	Non-destructive drilling
NEMP	National Environmental Management Plan
NEPC	National Environment Protection Council
NMI	National Measurement Institute
ORP	Oxidation Reduction Potential
PAH	Polynuclear aromatic hydrocarbons
PFAA	Perfluoroalkyl acids
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PSI	Preliminary site investigation
QA/QC	Quality assurance / quality control
SAQP	Sampling analysis and quality plan
SOP	Standard operating procedure
TDS	Total dissolved solids
TOC	Total organic carbons
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
USCS	Unified soil classification system

Executive Summary

Background

AECOM Australia Pty Ltd (AECOM) was engaged by Airservices Australia (Airservices) to deliver an environmental investigation referred to as Post-Preliminary Site Investigation (PSI) Targeted Sampling (the 'Investigation') at Airservices' current or former lease areas, collectively referred to as the 'Aviation Rescue Fire Fighting Services (ARFFS), located at Cairns Airport, Queensland ('the 'Airport' or 'site'). The location of the ARFFS and other site features are presented in **Figure F1** in **Appendix A**.

Purpose and Objectives

The purpose of the Investigation was to conduct targeted sampling to address perceived data gaps in the PSI findings and further inform whether per- and poly-fluoroalkyl substances (PFAS) impacts may be migrating from the Airport and potentially pose an unacceptable risk to aquatic biota and users of the Barron River and the coastal mangrove east of the Airport.

It is understood that this Post-PSI Targeted Investigation Sampling Report will inform regulatory and community stakeholders of the Investigation findings.

Investigation Scope

This Investigation was completed between March and June 2019. The Investigation fieldworks were conducted on and off the Airport and included the installation of three new groundwater monitoring wells, and groundwater, surface water, sediment and biota sampling.

Findings

The key findings of the Investigation are presented below.

On-Site Investigation

- PFAS concentrations exceeding the adopted human health guidelines have been detected in groundwater, surface water and sediment on Airport land. The PFAS impact is considered legacy as AFFF is no longer stored or used by ARFFS. The primary migration mechanisms for PFAS were identified as being the drainage lines and groundwater. The highest PFAS concentrations were detected at locations closest to three PFAS source areas identified in the western portion of the Airport; the ARFFS Fire Station, the ARFFS fire training ground (FTG) and the ARFFS workshop/former ARFFS Fire Station. The concentrations decrease markedly (orders of magnitude) with distance from these source areas, as an illustration:
    - The lateral migration of PFAS in groundwater on the Airport is likely limited by the subsurface geological and hydrogeological conditions (e.g. presence of clay soil with low hydraulic conductivity and saltwater encroachment / intrusion onto the Airport aquifer). It is noted that tidal influence of marine water and associated saltwater encroachment may impede the lateral migration of the PFAS plume, and prevent migration of PFAS impacted groundwater from discharging into Trinity Bay.

      Collectively, the above suggests that PFAS soil and groundwater impacts are likely to be localised close to the potential source areas. Furthermore, temporally the groundwater PFAS impact appears to have been consistent since 2008 and this suggests that the plume is relatively stable and mature, despite possible fluctuations associated with seasonal changes.
    - Lateral migration of PFAS in surface water and sediment across and from the Airport via the drainage system is apparent. However, PFAS concentrations decrease significantly with increased distance from the source areas. The drainage channel, which is connected to the Barron River, is affected by tidal flows (tidal gates were open at the time of sampling) so PFAS discharged into the channel will likely be attenuated by tidal dilution. This is supported by the observed PFAS concentrations in water samples from the drainage channel and Barron River.

- Hydrocarbons were detected in surface water and sediment samples from the stormwater drains and drainage channels and these may be due to the presence of natural hydrocarbons from organic matter, rather than indicating a manmade source such as fuel spillage.
- There were no exceedances of metal toxicants in surface water samples from Barron River, it is considered unlikely that there are unacceptable risks to the Barron River from heavy metals.

Off-Site Investigation

- The PFAS concentrations detected in the off-site biota, surface water and sediment samples did not exceed human health guideline levels indicating there is no adverse risk to human health from the consumption of seafood from the river or from the recreational use of the river, at the locations sampled. This conclusion is based on a limited number of biota samples, however, is supported by the consistent non-exceedance of guideline levels for surface water.
- Assessment of the risk to aquatic ecosystems from the PFAS concentrations in surface water concluded that the concentrations were of low significance and the risk is considered likely to be acceptable and further assessment is not warranted.
- Hydrocarbons were detected in surface water and sediment samples and these may be due to the presence of natural hydrocarbons as a result of the estuarine setting, rather than indicating a manmade source such as fuel spillage.
- Surface water samples were also analysed for faecal coliform and assessment of the results indicated exceedance of the guideline level for the recreational use of the water for primary contact activities such as swimming. There was no exceedance of the secondary contact screening level for recreational activities such as boating.

Conceptual Site Model Update

Based on these key findings, an updated conceptual site model has been developed and despite residual PFAS impact being identified on and migrating from the Airport, no complete and / or significant exposure pathways connecting on-site sources to off-site receptors have been identified.

The main data gaps identified for the Investigation include the following:

- The extent of PFAS in soil in the unsaturated zone in source areas and the localised lateral extent of PFAS in groundwater close to the three main source areas; ARFFS Fire Station, FTG and ARFFS workshop / former Fire Station. In particular, the extent of PFAS in groundwater hydraulically up-gradient of GW01 and concentrations along the western Airport boundary.
- Trends in PFAS in groundwater and surface water including the effects of seasonal changes.
- Nature of hydrocarbons detected in surface water and sediment (e.g. natural or petroleum-related).

1.0 Introduction

1.1 General

AECOM Australia Pty Ltd (AECOM) was engaged by Airservices Australia (Airservices) to deliver an environmental investigation referred to as Post Preliminary Site Investigation (Post-PSI) Targeted Sampling (the 'Investigation') at Airservices' current or former lease areas, collectively referred to as the 'Aviation Rescue Fire Fighting Services (ARFFS) areas, located at Cairns Airport, Queensland (the 'Airport' or the 'site'). The locations of the ARFFS lease areas and site features are presented in **Figure F1** in **Appendix A**.

1.2 Background

The Investigation was undertaken to address data gaps associated with the known presence of per- and poly-fluoroalkyl substances (PFAS) at a number of current and former firefighting facilities across Cairns Airport.

Cairns Airport is located within six kilometres (km) northeast of the Cairns central business district and is fringed by natural water bodies to the north (Barron River) and east (Trinity Bay). Airservices' primary responsibility is to provide safe and environmentally sound air traffic control management and related services to the aviation industry, including emergency response. For the provision of emergency response services, it is essential that hot fire training exercises and other maintenance activities are undertaken by ARFFS personnel at specialized purpose built training facilities, including fire training grounds (FTGs), where firefighting foams have been utilised to extinguish fires ignited to simulate conditions that may be experienced during potential aircraft accidents / crashes.

Investigations conducted between 2008 and 2018 have confirmed the presence of PFAS impacted media at Cairns Airport, including adjacent to areas utilised by ARFFS. ARFFS activities, among other sources at and near the Cairns Airport, were identified to have contributed to the PFAS contaminant load at and near the Airport. Widespread historical use of aqueous film forming foam (AFFF) containing PFAS, generally within designated ARFFS firefighting facilities, has been documented in historical data reviews, and there is the potential that PFAS concentrations may have migrated across the broader Cairns Airport and potentially off-site to the Barron River and Trinity Bay. The PFAS contamination historically identified at the Airport is legacy impact, given that in 2010 Airservices transitioned from using AFFF containing PFAS to fluorine-free foam, which does not contain PFAS.

The geometry of the PFAS impact, the PFAS transport mechanisms (potential for both on-site and off-site migration) and the potential exposure and impact to off-site receptors are not well understood and therefore require further investigation to refine the conceptual site model. Specifically, the following data gaps have been identified:

Identified on-site data gaps include:

- Sampling of surface water to allow better interpretation of migration of PFAS from the ARFFS Fire Station, including sampling along the stormwater drains such as the open stormwater drain running from the ARFFS Fire Station to the Barron River
- Sampling of groundwater down-gradient of the ARFFS FTG to assess the potential migration of impacted groundwater toward the Barron River (<500 m to the northeast)
- Sampling of groundwater down-gradient of the ARFFS Fire Station, [redacted] and ARFFS workshop to assess the potential migration of impacted groundwater toward the drainage system (including discharge to stormwater drains)
- Sampling of groundwater in the vicinity of the ARFFS workshop and former Fire Station to assess the potential migration of impacted groundwater toward the Barron River
- Characterisation of PFAS soil impacts associated with the ARFFS workshop.

Identified off-site data gaps include:

- Sampling of targeted aquatic biota to establish potential ecological impacts and inform preliminary risk to human health
- Sampling of water and sediment considered necessary to interpret the biota sampling
- Assessment of potential sources of PFAS which may migrate onto the Cairns Airport, including from the offsite waste water treatment plant located approximately 100m to the east of the northern portion of the eastern boundary of the Airport (**Figure F1** in **Appendix A**). The Investigation does not address this data gap.

1.3 Objectives

The purpose of the Investigation is to conduct targeted sampling to inform whether legacy PFAS impacts may potentially pose an unacceptable risk to aquatic biota and users of the Barron River and the coastal mangrove east of the Airport. This includes not only recreational users of the Barron River and Trinity Bay, but also local indigenous communities who may consume aquatic biota from these ecosystems as part of their normal diet.

Specifically, primary objectives include:

1. To build on the knowledge of potential sources of legacy PFAS contamination associated with the former use, storage, and waste management of historical AFFF products via on-site characterisation of groundwater and surface water to allow better interpretation of migration of PFAS from the Cairns Airport.
2. To develop an understanding of off-site PFAS contamination (if present) relating to potential receptors through the assessment of surface water, sediment and targeted aquatic species.
3. To use ARFFS, airport and regional related information regarding contamination sources and receptors to identify potential and/or complete exposure pathways and refine the current PFAS CSM.
4. To gather sufficient environmental data to identify data gaps and facilitate a recommendation for further action (if warranted).
5. To prepare a Post-PSI Targeted Investigation Sampling Report to inform regulatory and community stakeholders of the Investigation findings.

This report describes the results of the Post-PSI Targeted Investigation that was completed between March and June 2019.

1.4 Scope of Works

The scope of work undertaken to meet the objectives of the Investigation is listed below.

- Preparation of a sampling, analysis and quality plan (SAQP, [AECOM, 2019]) that identified the proposed sampling locations, rationale, approach, methodology and proposed quality assurance and quality control measures
- Drilling and collection of soil from three soil bores, which were then converted to groundwater monitoring wells. The groundwater wells were appropriately developed before sampling or gauging
- Collection of groundwater samples from three new and eleven existing groundwater monitoring wells. The top of the casing was surveyed to Australian Height Datum (AHD) in all new monitoring wells and in addition the water quality was gauged in all monitoring wells before sampling
- Collection of nine co-located surface water and sediment samples from selected drainage lines across the Airport
- Collection of off-site samples from four locations along the Barron River including four biota samples per location (total of 16), eight surface water samples (two samples at each location representative of ebbing and flowing tidal water), four sediment samples and four pore water samples. Note that due to inadvertent circumstances elutriate preparation was not conducted on

the sediment (containing pore water) samples and liquid was not extracted and as such, pore water was not analysed in this investigation.

- Laboratory analysis of soil, groundwater, surface water and sediment for PFAS with groundwater and surface water analysed for trace level concentrations. Selected samples were analysed for major ions, petroleum hydrocarbons, metals and coliforms.
- The complete data set was evaluated and utilised to develop a contemporary PFAS-focused conceptual site model (CSM) for the ARFFS leased areas.

1.5 PFAS Analysis

AFFF manufactured over the last 50 years are estimated to contain between 200 and 600 possible PFAS compounds of varying signatures / composition (PFAS National Environmental Management Plan [NEMP, Heads of EPA [HEPA] and Department of Energy and Environment [DoEE], 2018[1]). However at present, Australian commercial analytical laboratories, using National Association of Testing Authority (NATA) accredited methods, are currently able to analyse for around 28 PFAS (see **Table 1**). This analytical limitation is not considered significantly influential as the current PFAS laboratory analytical schedule includes the compounds that are regulated and were the primary ingredients of AFFF and therefore the compounds expected to be encountered where AFFF was used, stored and/or discharged.

Table 1 Compounds Analysed in the PFAS Suite

PFAS Group	Compound	Abbreviation	CAS No.
Perfluoroalkyl Sulfonic Acids	Perfluorobutane sulfonic acid	PFBS	375-73-5
	Perfluoropentane sulfonic acid	PFPeS	2706-91-4
	Perfluorohexane sulfonic acid	PFHxS	355-46-4
	Perfluoroheptane sulfonic acid	PFHpS	375-92-8
	Perfluorooctane sulfonic acid	PFOS	1763-23-1
	Perfluorodecane sulfonic acid	PFDS	335-77-3
Perfluoroalkyl Carboxylic Acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnDA	2058-94-8
	Perfluorododecanoic acid	PFDoDA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluoroalkyl Sulfonamides	Perfluorooctane sulphonamide	FOSA	754-94-6
	N-Methyl perfluorooctane sulfonamide	MeFOSA	31506-32-8
	N-Ethyl perfluorooctane sulfonamide	EtFOSA	4151-50-2
	N-Methyl perfluorooctane sulfonamidoethanol	MeFOSE	2448-09-7
	N-Ethyl perfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2
	N-Methyl perfluorooctane sulfonamidoacetic acid	MeFOSAA	2355-31-9
	N-Ethyl perfluorooctane sulfonamidoacetic acid	EtFOSAA	2991-50-6
Fluorotelomer Sulfonic Acids	4:2 Fluorotelomer sulfonic acid	4:2 FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2 FTS	39108-34-4
	10:2 Fluorotelomer sulfonic acid	10:2 FTS	120226-60-0

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[1] Noting that the Draft NEMP Version 2.0 is currently out for public comment until June 2019 with expected publication in early 2020.

1.6 Relevant Regulation and Guidance

The Investigation was performed consistent with Federal, State and local government environmental legislation and requirements.

This targeted investigation has been developed considering the following legislation and guidance.

- Airports (Environment Protection) Regulations 1997 made under the *Airports Act 1996*
- *Environmental Protection Act, 1994.*
- Heads of Environment Protection Authorities Australia and New Zealand (HEPA) 2018 *PFAS National Environmental Management Plan (NEMP)*
- National Environment Protection Council (1999) *National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B2: Guideline on Site Characterisation (as amended in May 2013*) (ASC NEPM 2013)
- Standards Australia (AS4482.1-2005) *Guide to the sampling and investigation of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds*
- Standards Australia (AS 4482.2-1999) *Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile Substances*
- Western Australian Department of Health (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia*
- Queensland Government (2019) *Guideline for sampling and analysis of seafood suitable for human health risk assessments of PFAS contamination.*

A summary of proposed Tier 1 investigation and screening levels for further assessment works at Cairns Airport is provided in **Section 5.0**.

2.0 Airport Setting

2.1 Airport Location

Cairns Airport is located approximately 6 km to the north of the Cairns central business district and is bound by the Barron River along its northern boundary, which discharges into Trinity Bay. The Airport location is shown in **Figure F1**, **Appendix A**. Airport identification details are presented in **Table 2**.

Table 2 Site Identification

Lease Area	Summary
Street Address	Airport Avenue, Cairns, Queensland
Area	128.5 ha
Title identifiers	Lot 4 and 5 SP146888, Lot 1 RP736304, Lot 1 RP736303
Current land use	Transport and communications, airports/aerodrome

2.2 Airport and ARFFS Layout

Key features at the Airport were identified in the PSI (GHD, 2018a) and are shown on **Figure F2**, **Appendix A.** A summary is provided below. An inspection of the ARFFS areas was not conducted by AECOM. For further information, please refer to the PSI (GHD, 2018).

ARFFS Lease Areas

- ARFFS Fire Station which was built in the late 1980s is located to the west of the runway in the northern portion of the General Aviation Area, [redacted] facility. A bunded chemical storage unit is present to the rear of the single storey building and is used to store the fluorine-free foams. The airport's western stormwater drainage discharges northwards along a channel and into the Barron River. This channel lies to the east of the FTG and receives runoff from it. This channel also receives runoff from (both sides of) the Fire Station and general aviation areas further south. This could include capture of runoff from the former fire station site. The stormwater drainage is shown in **Figure F2**, **Appendix A**.
- The ARFFS mechanical workshop is located within the general aviation area, south of the aircraft apron between two aircraft hangars. The workshop used to be run by the facilities management area of Airservices, and the ARFFS vehicles were maintained here. But when those broader activities were relocated, ARFFS took over and continued use of the site for vehicle maintenance.
- ARFF FTG in the northwestern portion of the Airport. This includes a concrete training pad with a large mock-up (LMU) / training fuselage. Historically, the ground surface was road base. A grassed area to the north referred to as the drill ground.
- Areas used historically for training. The PSI identified that three open space grassed areas were historically used for training on an ad hoc basis. AFFF was potentially discharged during historical firefighting training events. These areas are located in the northwestern corner of the Airport and to the north of the International Terminal (directly south of Barron River), and a third location to the east of the International Terminal adjacent to the Ellie Point Beach and mangrove forest. The PSI did not identify whether these were controlled by ARFFS.

Other features

- General aviation area in the western portion of the Airport including aircraft hangars and other aviation buildings
- The former Fire Station consists of two small buildings located in the northeastern portion of the general aviation area, south of the aircraft apron. It is currently in use by a helicopter operator.
- Runway orientated northwest / southeast with taxiways connecting the runway with the terminal
- Domestic and international terminals, located in the eastern section of the Airport

- Northern wastewater treatment plant to the north of FTG. The treatment plant discharges to the drainage channel running alongside the FTG, which discharges into the Barron River
- Surface water drainage channels transect the Airport as shown in **Figure F2**, **Appendix A**.

2.3 Surrounding Land Use

Surrounding land uses described by GHD (2018a) were as follows:

North: The riparian corridor of the Barron River is located to the north of the Airport and flows east into Trinity Bay.

South: Medium density commercial and industrial development along Captain Cook Highway, bordering on undeveloped coastal forest. The confluence between Trinity Bay and Chinaman Creek is located approximately 1.2 km to the south east.

East: Undeveloped coastal forest including mangroves with Trinity Bay located approximately 2 km east.

West: Captain Cook Highway, to the west separates the Airport from Mount Whitfield Conservation Park which is intersected by pockets of light and medium density residential development. Light to medium density industrial and commercial activities are located to the northwest.

No changes to the surrounding land use are noted since the completion of the PSI (GHD, 2018a).

2.4 Summary of Previous PFAS Related Investigations

2.4.1 Summary of Past Investigations

AECOM has reviewed a number of historical reports detailing environmental assessments which have been undertaken at the ARFFS' areas. Reports reviewed include:

- GHD, 2008 – Report for ARFFS National Testing Project, Preliminary Site Contamination Assessment – Cairns ARFFS Drill Ground, Cairns Airport.
- SLR Consulting, 2013 – Airservices Cairns Fire Station Water and Soil Quality Assessment.
- GHD, 2014 – AFFF Soil and Groundwater Assessment, Cairns ARFFSS Drill Ground.
- GHD, 2017 – Airservices Australia, Cairns Airport HFTG Assessment Geotechnical Investigation Report.
- GHD, 2018a – Airservices Australia, Draft Cairns Airport Preliminary Site Investigation.
- GHD, 2018b – Airservices Australia, Draft Cairns Airport Preliminary Sampling Report.

For all historical reports listed, no Australian screening criteria were available and instead criteria were adopted from the overseas jurisdictions. The NEMP (2018) guidelines were issued in 2018 and have been used in the current investigation for the first time.

Section 2.4.2 to **Section 2.4.7** provide a summary of the documented knowledge relating to PFAS contamination at the Airport. Key features of the Airport are shown on **Figure F1**, **Appendix A**. Historical data sampling locations have been extrapolated and are presented on **Figure F2**, **Appendix A**.

2.4.2 Report for ARFFS National Testing Project, Preliminary Site Contamination Assessment – Cairns ARFFS Drill Ground, Cairns Airport (ref 41/20219/00/378625), GHD (2008)

This report detailed the findings of a desktop and limited ground investigations, that targeted the current ARFFS FTG and associated grassed area to the north.

Anecdotal evidence confirmed that ARFFS had undertaken fire-fighting exercises within the FTG and, prior to construction of the FTG, in an adjacent grassed area. Exercises were undertaken on a fortnightly basis using accelerants (kerosene, petroleum), AFFF and dry chemical powder. Runoff water was either treated via a 'Clearmake' separator (installed approximately 2005) and discharged to the stormwater network, or was treated via a triple interceptor located to the north of the FTG and discharged to sewer. When not subject to active training, runoff from the FTG drained via the grassed area to the north to a stormwater drainage channel (stormwater drain), which in turn discharged to the Barron River (~800 m north).

A Contamination Remediation Plan prepared by Golder Associates (2005; not sighted by AECOM) was reviewed by GHD and addressed an area of hydrocarbon contamination to the north, northwest and west of the FTG. Further investigation of this area had also been undertaken by Golder Associates (2007; again the report was not sighted), which was also reportedly reviewed by GHD. This investigation included sampling water collected from the triple interceptor discharge point in the stormwater drainage channel. The results identified detectable concentrations of total petroleum hydrocarbons (TPH), toluene and non-ionic and anionic surfactants in the sample collected. The concentration of non-ionic surfactants exceeded the adopted ANZECC (2000) freshwater 95 percent species protection guideline level for methylene blue anionic surfactant (MBAS) (exact concentration not specified). The extent of remedial activities undertaken by Golder Associates (as described in the documents above) was not described by GHD.

Limited soil sampling across the FTG by GHD (2008) identified concentrations of hydrocarbons which exceeded the nominated investigation levels (TPH C_{10}-C_{14}, 430 mg/kg and TPH C_{15}-C_{28}, 1950 mg/kg in soil sample CA2-2). Concentrations of perfluorooctane sulfonate (PFOS) which ranged from 0.17 mg/kg to 1.9 mg/kg were below the adopted industrial criteria (40 mg/kg) in all soil samples submitted for analysis. Perfluorooctanoic acid (PFOA) was also present in two of the three soil samples (CA2-3 at 0.22 mg/kg and CA3-3 at 0.37 mg/kg), at concentrations below the adopted industrial criteria (200 mg/kg).

Groundwater sampled from monitoring well CA03, within the FTG, reported a concentration of PFOS (4.5 µg/L) above the criteria adopted for this investigation with PFOA reported at a concentration (0.34 µg/L) below the adopted criteria.

2.4.3 Airservices Cairns Fire Station Water and Soil Quality Assessment (ref 622.10325), SLR Consulting (2013)

SLR (2013) undertook an assessment of the potential for contamination of surface water, groundwater and soil at the FTG, including PFAS, petroleum hydrocarbons (including monocyclic- and polycyclic-aromatic hydrocarbon compounds [MAH and PAH, respectively]), metals and MBAS.

It was noted that when generating a surrogate surface water sample from the fire training pad using water discharged from a fire hose (referred to as sample SW4), the surface of the pad was observed to spontaneously foam despite no AFFF having been applied during sampling, a potential indicator that the pad had been impregnated with residual PFAS. Alternatively, this could have occurred due to the presence of residual surface material after holding wastewater on the pad to allow maximum evaporation before draining to the underground tanks prior to treatment.

Concentrations of PFOS (ranging from 1.74 µg/L to 25.1 µg/L) and PFOA (ranging from 0.68 µg/L to 11.4 µg/L) were detected in all surface water samples (collected from surface water bodies and from the surrogate run off sample collected via hose) at concentrations above the adopted screening criteria (0.3 µg/L for both PFOS and PFOA). Concentrations of 6:2 fluorotelomer sulfonate (6:2 FtS) were detected in two of the four surface water samples (SW1, 1.1 µg/L and SW3, 1.7 µg/L, both collected from surface water bodies). Concentrations of MBAS and some metals (arsenic, chromium, copper, lead and zinc) also exceeded the ANZECC (2000) marine 95% species protection guidelines in all surface water samples.

Concentrations of TPH C_6-C_9 were detected in one surface water sample (SW1, 240 µg/L) and TPH C_{10}-C_{36} (maximum concentration 33,200 µg/L in SW1) was detected in all surface water samples at concentrations exceeding the Airport (Environment Protection) Regulation (1997). Hydrocarbon detections were attributed to a surfactant based origin. Concentrations of some metals (chromium, nickel, lead and zinc) were also detected at concentrations exceeding the ANZECC (2000) guidelines for the protection of 95% species.

Reported PFOS and PFOA concentrations (25.1 µg/L and 0.3 µg/L, respectively) in groundwater (sampled from CA3, described as GW1 in this report) were detected at concentrations exceeding the adopted commercial / industrial criteria[2] (0.3 µg/L for both PFOS and PFOA). It is unclear why the PFOS concentrations in CA3 / GW1 reported in 2013 were five times greater than in 2008 (GHD).

PFOS and PFOA were detected in all soil samples collected and submitted for analysis at concentrations that did not exceed the adopted commercial / industrial criteria (6 mg/kg for PFOS and 16 mg/kg for PFOA).

SLR (2013) concluded that contaminants present at the FTG could cause harm to the environment if not managed properly, however, SLR considered that current environmental controls (such as bunding and water capture for off-site disposal) were appropriate to minimise the potential for future contamination.

SLR (2013) considered that further assessment of groundwater in the vicinity of the FTG, and within the Barron River was warranted.

2.4.4 AFFF Soil and Groundwater Assessment, Cairns ARFFSS Drill Ground (ref 42/18356), GHD (2014)

GHD (2014) completed a preliminary assessment of the potential contamination impacts from training activities at the FTG, in order to build on the findings of the previous investigations (GHD, 2008 and SLR, 2013).

Further anecdotal information presented in this report indicated that until approximately 1994, the mock fuselage (LMU) had been located on the western edge of the FTG, with fire training activities conducted directly onto the unpaved soil surface. The ‘Clearmake’ separator (previously described in **Section 2.4.2**) had not been used to treat wastewater since 2006 as it was not considered to be an effective treatment process. Instead wastewaters were temporarily stored in above ground holding tanks until the contents were emptied by subcontractors and disposed off-site. Approximately 4,000 to 5,000 L of AFFF concentrate was used annually until 2010, when ARFFS discontinued the use of AFFF for training exercises. Purple-K Dry Chemical was in use at the FTG. Anecdotally, analytical testing undertaken by others (not GHD) had confirmed the presence of PFOS in wastewater collected from training activities, however, no laboratory data were reported to have been sighted by GHD (2014).

It was reported (in GHD, 2014) that soil samples collected from five soil bores across the FTG recorded detectable concentrations of PFOS (maximum concentration 1.98 milligram per kilogram [mg/kg] in CA06_1). PFOA was detected in eight soil samples (maximum concentration 0.0929 mg/kg in CA7_2). The concentrations of PFOS and PFOA did not exceed the adopted industrial assessment criteria (14 mg/kg for PFOS and 13 mg/kg for PFOA) which were not developed to be protective of water.

Three sediment samples were collected from the swale drain immediately adjacent to the FTG. All samples recorded detectable concentrations of PFOS (maximum concentration 0.20 mg/kg in CASED3, located downstream of the FTG). Concentrations of PFOA were also detected in one sample (maximum concentration 0.0053 mg/kg in CASED3). None of the PFOS and PFOA concentrations exceeded the adopted assessment criteria (14 mg/kg for PFOS and 13 mg/kg for PFOA). Reported concentrations of PFOS and PFOA were generally lower in upstream samples, closer to the FTG, when compared to downstream samples, which were further away from the FTG.

Concentrations of PFOA in groundwater exceeded the adopted screening criteria for drinking water (0.3 µg/L) in all samples (maximum concentration 1.44 µg/L, CA4, located downgradient of the FTG) with the exception of dissolved PFOA concentrations detected in CA8 which did not exceed the adopted screening criteria. Reported concentrations of PFOS exceeded the adopted screening criteria for drinking water (0.3 µg/L) in all groundwater samples (maximum concentration 44.3 µg/L in CA4). It was identified that these concentrations may pose a risk to ecological receptors within the Barron River should off-site groundwater discharge from Cairns Airport be occurring, however limitations on the suitability of the adopted ecological criteria (internationally sourced) were noted. It was also noted that the groundwater analytical results from well CA3 (25.1 µg/L PFOS, PFOA not analysed) reported by SLR (2013, reported as GW1 in this report, and in GHD 2008 and in GHD 2014)

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[2] Note that no Australian screening guideline values were available prior to 2018, and instead criteria were adopted from overseas jurisdictions.

were an order of magnitude greater than those reported by GHD in both 2008 (0.34 µg/L PFOA and 4.5 µg/L PFOS) and 2014 (0.32 µg/L PFOA and 4.57 µg/L PFOS).

Based on the results of the investigation, it was inferred that concentrations of PFOS and PFOA in groundwater generally increased from west to east, reflecting the inferred groundwater flow direction.

GHD (2014) noted that there were no correlations between PFAS concentration and total organic carbon (TOC), metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc) or pH for soils, sediment or groundwater.

GHD (2014) reported that contamination continued to occur at the FTG based on visually observed indicators of hydrocarbons (sheen, odour) in overflow from the wastewater tanks and in the swale drain in the vicinity of the FTG. Furthermore, the presence of PFAS in soils was considered to potentially provide an ongoing source of PFAS to groundwater, sediment and surface water. Further delineation of contamination at the FTG was recommended by GHD (2014).

2.4.5 Airservices Australia, Cairns Airport HFTG Assessment Geotechnical Investigation Report (ref 4220326), GHD (2017)

GHD (2017) undertook a factual geotechnical assessment of the Cairns Hot Fire Training Ground (HFTG) (Site) to facilitate the construction of a new 50 kL above ground water tank at the FTG. Soil samples were collected in each of two geotechnical soil bores at depths of 0.2 metres below ground level (mbgl), 0.5 mbgl, 1.0 mbgl and at 1 metre intervals thereafter to a maximum depth of 10 mbgl for analysis for potential contaminants.

Concentrations of total recoverable hydrocarbons (TRH), MAHs, PAHs, organochlorine and organophosphate pesticides (OCP/OPP) and polychlorinated biphenyls (PCBs) did not exceed the limit of detection in any soil sample submitted for analysis. Concentrations of metals were within the ASC NEPM 2013 Health Investigation Level D Commercial/Industrial Land Use (HIL-D).

The sum of PFOS and perfluorohexane sulfonate (PFHxS) concentrations in soil ranged between 0.27 mg/kg and 1.15 mg/kg, which were below the Airservices' (2015) ecological interim terrestrial screening levels for commercial / industrial land, and the Airservices health based screening criteria for commercial / industrial land (GHD, 2017b).

GHD (2017a) recommended that once the exact location and extent of the proposed disturbance was known, further sampling should be undertaken for waste characterisation purposes

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2.4.6 Airservices Australia, Draft Cairns Airport Preliminary Site Investigation (ref 31/34249), GHD (2018a)[3]

GHD (2018a) undertook a Stage 1 preliminary site investigation (PSI) of the broader Cairns Airport to define potential for contamination associated with PFAS and develop a CSM. The PSI was undertaken in 2016 with the report issued in 2018.

Sources of PFAS associated with ARFFS and with non-ARFFS activities (including at locations outside the Cairns Airport property boundary) were identified by GHD (2018) and included:

ARFFS Sources:

- The FTG
- The ARFFS Fire Station
- ARFFS workshop
- Historical training areas to the north-west and north-east of the Airport (it is unclear whether these were controlled by ARFFS).

Non-ARFFS Sources:

- Surface water drainage channels

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[3] AECOM was provided with a copy of draft final version of this report for review purposes.

- Former Fire Station
- [redacted]
- Foam extinguishers in hangars [redacted]
- Foam discharge events, including a vehicle fire to the south west of Cairns Airport, near Tom Macdonald Drive (outside the Cairns Airport property boundary, operated by Cairns City Council)
- The wastewater treatment plant (situated outside the Airport property boundary).

Potential receptors identified included workers at ARFFS sites and across the broader Airport, consumers of seafood or other recreational users of the downgradient Barron River and Trinity Bay, and terrestrial/aquatic biota that may uptake PFAS sourced from on-site or from the downstream receiving environment. Potential pollutant linkages were identified for these receptors, pending further investigation.

Preliminary sampling results were included and are discussed in more detail in the Preliminary Sampling Report (GHD, 2018a; refer to **Section 2.4.7**).

2.4.7 Airservices Australia, Draft Cairns Airport Preliminary Sampling Report (ref 31/34249), GHD (2018b)[4]

GHD (2018b) completed preliminary sampling to validate the CSM established during the Stage 1 PSI (GHD, 2018a, refer to **Section 2.4.6**). The sampling was completed in 2017 (and reported in GHD, 2018b). The work was completed prior to the issue of the NEMP (2018), which presents Australian guideline values for health and protection of ecosystems.

The GHD (2018b) investigation comprised the installation of seven groundwater monitoring wells (GW01 to GW07) across the Airport and collection of groundwater samples. Groundwater wells were located in areas targeting potential primary sources of PFAS, comprising current and historical FTGs (including the informal grassed areas near the current FTG) and the ARFFS Fire Station and also across the Airport (referred to as the General Aviation Area by GHD). Samples were also collected at the Airport off-site discharge points, including at four open stormwater drain locations (three of these had co-located sediment samples) to gauge the potential for PFAS migration via the Airport's stormwater network.

Reported concentrations of PFAS in soils were all below the laboratory limit of reporting (LOR) or below the adopted human health and ecological assessment criteria, as set out in the Airservices Australia Interim Contamination Management Framework (GHD, 2015). Maximum concentrations of PFAS detected in soil included 0.357 mg/kg PFOS (GW01-1.5), 0.0071 mg/kg PFOA (GW01-1.5), 0.004 mg/kg, 8:2 fluorotelomer sulfonate (8:2 FtS) (GW02-1.0) and 0.0334 mg/kg PFHxS (GW01-1.5). Location GW01 is within the General Aviation Area and GW02 is adjacent to the FTG. The PFAS concentrations reported in soil were comparable to previous investigations conducted across the broader Airport outside of the ARFFS areas.

Additional Australian Standard Leaching Procedure (ASLP) testing was undertaken on nine of the soil samples, with three of these samples reported as generating leachable PFOS and PFHxS at concentrations above the adopted Department of Health (DoH, 2017) drinking water guideline. Two of these samples also exceeded the DoH (2017) recreational water guideline (maximum sum concentration 9.88 µg/L from GW01-1.5). The soil sample from GW01-1.5 also contained leachable PFOS at concentrations exceeding the adopted ecological criteria for toxicity effects on aquatic organisms (defined in GHD, 2017).

During drilling, groundwater across Cairns Airport was encountered at depths of between 1.0 mbgl (GW04) to 2.5 mbgl (GW02). No assessment of tidal influence was undertaken. Water quality ranged from acidic (pH 4.05, GW04) to neutral (pH 6.69, GW03) and fresh (347 µS/cm, EW03/CA03) to saline (74,424 µS/cm, GW03). Groundwater flow direction was inferred to be toward the north east (toward the Barron River) in northern portions of Cairns Airport, tending toward an easterly direction in the central and southern portions of Cairns Airport.

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[4] AECOM was provided the draft final version of this report for review purposes

PFAS concentrations were detected in all groundwater samples except in monitoring well GW07, located cross hydraulic gradient (to the southeast) of the majority of airport infrastructure and adjacent to the small craft runway. Reported concentrations of PFOS in two groundwater samples exceeded the adopted ecological screening level for toxicity to aquatic organisms (defined in GHD, 2017) (29.6 µg/L, GW01; 101 µg/L, GW02). Concentrations of PFOA also exceeded the drinking water criteria (DoH, 2017) (1.34 µg/L, GW01; 6.82 µg/L, GW02). Six of the groundwater samples recorded PFOS and PFHxS at concentrations above the DoH (2017) drinking water guideline (maximum sum concentration 135 µg/L, GW02). Generally, the highest PFAS concentrations in groundwater were identified near the ARFFS Fire Station (GW02, GW03), general aviation area/ARFFS workshop (GW01) and ARFFS FTG (EW3/CA03/GW1), which is consistent with the findings of previously conducted investigations.

PFAS concentrations were also detected in one surface water sample, collected from a northern drainage swale at the off-site discharge point to the Barron River (SW04). Concentrations of PFOS at this location (0.1 µg/L) exceeded the human health fish consumption criteria for both fresh and marine water (GHD, 2017), but the results were below the toxicity effects in aquatic organisms and the recreational water guideline (defined in GHD, 2017). PFAS was not detected in the other three surface water samples collected from swale drains/creeks adjacent to the Airport boundary.

Co-located sediment samples were collected from SW01/SS01, SW02/SS02 and SW04/SS04, no sample was collected from SW03 given no sediment was present within the concrete drain. Concentrations of PFOS were detected in all three sediment samples at concentrations below the adopted commercial / industrial criteria (maximum concentration 0.0031 mg/kg, SS01) and concentrations of perfluorodecanoic acid (PFDA) were detected in SS02 (0.0002 mg/kg). No other PFAS were detected above the LOR. GHD (2018b) made no remarks regarding rainfall in the period preceding the sampling event, although, samples appeared to be collected at the start of the wet season (November).

Overall, it was surmised that the historical primary sources of PFAS at the Airport included the Fire Station, ARFFS Workshop and the FTG. Other sources may have included previous training or releases of AFFF due to spills or crash incidents in other parts of the airport. GHD (2018b) acknowledged that the use of AFFF containing PFAS was phased out and thus the primary source of PFAS driving the spread of contamination had been removed. GHD (2018b) concluded that secondary sources such as impregnated concrete pads, residual soil in the grassed training area to the north of the FTG and ARFFS Fire Station and workshop may all continue to contribute to ongoing PFAS contamination at the Airport.

The updated CSM (developed by GHD, 2018a) concluded that there were potential human health risks associated with on-site workers being directly exposed to contaminated media, the consumption of seafood from nearby receiving surface water bodies and the incidental ingestion of waters through consumption or recreational use. Potential ecological risks included the discharge of PFAS impacted media to the surrounding marine ecosystem, uptake by biota and subsequent bioaccumulation in the food chain. Further investigation of the potential source-pathway-receptor linkages (including biota sampling) was recommended.

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3.0 Environmental Setting

3.1 Site Topography and Hydrology

The Airport is described as generally flat, with elevations less than 4 m Australian Height Datum (AHD) (GHD, 2018a). It was noted that some filling of the area has historically occurred, including around the FTG, Bureau of Meteorology building and the Terminals.

Surface water across the northern portion of the Airport is captured by a network of stormwater drains (also referred to as swale drains), which discharge to the Barron River (GHD, 2018a). Drainage in the southern portion of the Airport is via water channels which drain to Ellie Point Beach and the mangrove forest (GHD, 2018a). Stormwater drains have tidal gates on them. When these are closed tidal influence is restricted downstream of the gates. Stagnant water may be present upstream of the gates, except following high rainfall events.

3.2 Geology

Geology at and in the vicinity of the Airport is described as Holocene-aged beach ridges, cheinier ridges and river mouth spits and bars characterised by sand and gravelly sand (MinesOnlineMaps).

Bore logs presented in GHD (2018b) indicated a fill layer from 0 to 2.0 mbgl consisting of sandy silt, sand, silty sand material with fine to coarse gravel overlying a natural soil layer between 2.0 and 4.5 mbgl consisting of sandy clay and silty clay with some sand lenses. Limited information regarding Acid Sulphate Soils (ASS) at the Airport is available. An investigation of ASS presence near the Airport Air Traffic Control Tower (ATCT) was conducted by Golder Associates in 2016[5], which concluded that field screening and laboratory assessment indicated the absence of ASS near the ATCT. A desktop review conducted by GHD (2017a) indicated that ASS is likely to exist at the natural soil profile and pockets of ASS are likely to be present in the region.

3.3 Hydrogeology

GHD (2018a) described groundwater as being hosted in the shallow coarse sands which underlay the Airport. Typical depths to groundwater ranged between 0.9 mbgl to 1.7 mbgl (likely dependent on localised topographical features such as filling) and likely fluctuate because of tidal influence and seasonal conditions (wet/dry season). GHD (2018b) indicated groundwater flow direction is from west to east with the flow direction in the northern portion of the site to the northeast towards the Barron River.

GHD (2018a) also undertook a search of the registered groundwater bore database and indicated that records in this area are typically incomplete. Two groundwater bores were located <50 m to the west of the Airport, in the vicinity of the wastewater treatment plant and surrounding industrial area however little is known regarding installation details. One existing registered bore listed as being used for water supply purposes (RN148430) is located approximately 100 m west and up-hydraulic gradient of the Airport. The bore is screened at depth from 18 to 22 mbgl, within the regional aquifer.

The nearest registered groundwater bore with a complete log is located approximately 600 m to the west of the Airport. At this location, shallow fine to coarse sands extended to 7 mbgl, underlain by clays from 8-18 mbgl and coarse grey sands from 18 mbgl (the regional water bearing lithology). Given its up-gradient location, this bore would not be impacted by PFAS concentrations sourced from the Airport and therefore not a potential exposure route.

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[5] Golder Associates (2016) Cairns Airport Traffic Control Tower Refurbishment Works – Contamination and Acid Sulphate Soil Assessment, Cairns Airport.

4.0 Fieldwork- DSI

4.1 Overview

Fieldwork was completed in accordance with the Sampling Analysis and Quality Plan (SAQP) dated 25 March 2019 (AECOM, 2019).

The fieldwork was completed between March and June 2019. Details of tasks completed are shown in **Table 3**. There was a time delay between off-site sampling in March and on-site sampling in May/June due to weather events and time required to arrange access permissions through the Airport operator.

Table 3 Summary of Fieldwork

Activity	Dates
Off-site sampling along Barron River (biota, surface water, sediment at SW10 to SW13)	26-27 March 2019 (end of wet season)
Service clearance and drilling of three (3) soil bores (GW08A, GW09, GW10), conversion to groundwater monitoring wells, well development	27 May – 28 May 2019 (dry season)
Groundwater monitoring of 12 wells, collection of nine co-located surface water and sediment samples	4 June – 5 June 2019 (dry season)
Positional surveying and groundwater monitoring of two monitoring wells	12 June 2019 (dry season)

4.2 Sampling Rationale

An overview of the rationale for on-site sampling locations is presented in **Table 4**. The sampling locations are shown on **Figure F2**, **Appendix A**. The coordinates of sampling positions are shown in **Table T1**, **Appendix B**. Photographs taken during the fieldworks are shown in **Appendix C**.

Table 4 Sampling Rationale On-site

ID	Media*	Location	Rationale
GW08A** Newly installed groundwater monitoring well	S, GW	<100 m downgradient (north east) of FTG	Monitoring wells installed to characterise groundwater quality down-gradient of the FTG where PFAS contamination in groundwater had been previously detected. These locations also provide an indication of groundwater quality at the downgradient Airport boundary.
GW09 Newly installed groundwater monitoring well	S, GW	<500 m downgradient (north east) of FTG and approximately 250 m south of GW10 adjacent to Barron River	
GW10 Newly installed groundwater monitoring well	S, GW	<500 m downgradient (north east) of FTG and approximately 250 m north of GW10, adjacent to Barron River	
GW01 Existing groundwater monitoring well	GW	Within the General Aviation Area	To characterise current groundwater quality within the General Aviation Area and at locations cross/up-gradient of ARFFS facilities.

ID	Media*	Location	Rationale
GW02 Existing groundwater monitoring well	GW	West of the Fire Station	To characterise current groundwater quality in the vicinity of the current ARFFS Fire Station. It is noted this location is up-gradient of the Fire Station buildings.
GW03 Existing groundwater monitoring well	GW	[redacted] <100 m up-gradient from the Fire Station	To characterise current groundwater quality [redacted]. It is noted this location is up-gradient of the ARFFS Fire Station buildings [redacted]
GW04 Existing groundwater monitoring well	GW	In the north western corner of the Cairns Airport, <150 m south east of the Barron River	To characterise current groundwater quality at the cross-gradient boundary, adjacent to an area of documented historical fire training activities.
GW05 Existing groundwater monitoring well	GW	<450 m north of the International Terminal, adjacent to the Barron River	To characterise current groundwater quality at the down-gradient Airport boundary, adjacent to an area of documented historical fire training activities.
GW06 Existing groundwater monitoring well	GW	<350 m northeast of the International Terminal	To characterise current groundwater quality at the down-gradient Airport boundary, adjacent to an area of documented historical fire training activities.
GW07 Existing groundwater monitoring well	GW	Approximately 1 km south of the Domestic Terminal and 1 km east of the General Aviation Area, adjacent to the small craft runway	To characterise current groundwater quality cross-gradient in the southeastern area of the Airport.
CA01	GW	<30 m east of FTG	To characterise current groundwater quality and trends to the east of the FTG where PFAS was detected in 2014.
CA08	GW	<10 m west of FTG	To characterise current groundwater quality and trends to the west of the FTG where PFAS was detected in 2018.
CA03 (EW03/EW3/ /CA3/GW1)	GW	<100 m downgradient of FTG	To characterise current groundwater quality and trends down-gradient of the FTG where PFAS has been historically detected.
MW05	GW	Within the FTG concrete pad	To characterise current groundwater quality and trends at the location with the FTG concrete pad. PFAS has been historically detected in this well in 2014.
SW01	SW / SS	South eastern drainage swale	Resampling of locations monitored during GHD (2018) sampling event to provide current surface water and sediment quality.
SW02	SW / SS	Drainage channel south of the Domestic Terminal	
SW03	SW / SS	North eastern drainage swale discharge point to Barron River	

ID	Media*	Location	Rationale
SW04	SW / SS	Northern drainage swale discharge point to Barron River	
SW05	SW / SS	Stormwater drainage swale at Fire Station (upstream location)	Sampling of surface water/sediment to investigate the potential source of PFAS detected at SW04 during the GHD (2018) sampling event.
SW06	SW / SS	Fire Station drainage swale, at confluence of FTG drainage swale	
SW07	SW / SS	Fire Station/FTG drainage swale, at confluence of historical fire training area drainage swale	
SW08 / SW08A	SW / SS	Fire Station drainage swale at the mid-point between first and second confluence. As there was no water present at this location, an alternative sampling location (SW08A) was identified. This sampling location was along the drainage channel post discharge of the swale drain.	
SW09	SW / SS	Fire Station/FTG drainage swale, at confluence of historical fire training area drainage swale	

Note: ** SW = Surface Water, SS = Sediment, BIO = Biota*

*** It should be noted that GW08A was a replacement location for the originally proposed location of GW08. GW08 was located between the eastern portion of the FTG and runway, however could not be drilled due to restrictions on drilling close to the runway.*

A summary of the off-site sampling locations and rationale is included in **Table 5**. The locations are shown on **Figure F2**, **Appendix A**.

Table 5 Off-site sampling locations and rationale

ID	Media*	Location	Rationale
SW10 / SS10	SW / SS / BIO	Barron River	To characterise sediment, surface water and biota in the Barron River adjacent to the outlet of the stormwater channel.
SW11 / SS11	SW / SS / BIO	Barron River	
SW12 / SS12	SW / SS / BIO	Barron River	
SW13 / SS13	SW / SS / BIO	Barron River	

Note: ** S = Soil, GW = Groundwater, SW = Surface Water, SS = Sediment, BIO = Biota*

Four aquatic biota (fish and crustacea) specimens were collected from the four locations (SW10 to SW13) adjacent to the northern boundary of the Airport in the Barron River and Trinity Bay (total of 16 samples), the sampling locations are shown on **Figure F2**, **Appendix A**. Four co-located surface water and sediment samples were collected from the same sampling locations.

4.3 Methodology

Due to the ubiquity of PFAS used in a variety of everyday products and the potential for cross contamination during sampling activities, the recommended mitigation practices identified in the NEMP (2018) and Western Australia's Department of Environmental Regulation (2017) were implemented during the sampling program as stipulated in the SAQP (AECOM, 2019).

4.3.1 Soil Investigation

Sampling methodologies and details relating to laboratory analysis of samples are described in the SAQP (AECOM, 2019). The soil investigation methodology is described in **Table 6**.

Table 6 Soil Investigation Methodology

Activity/Item	Details
Service location	AECOM obtained on-site utility plans and Dial-Before-You-Dig service before the start of the works. A contractor (Cairns Underground Service Locators) conducted service location and cleared proposed bore locations for services. Soil bore were advanced by hand auger methods to 1.5 mbgl to confirm the absence / presence of underground utilities.
Drilling method and target depth	Soil bores (for conversion to groundwater monitoring wells) were advanced with a Geoprobe drilling rig using solid stem augers to the target depth (3 mbgl).
Soil logging	Soil logging was in accordance with the unified soil classification system (USCS) and AS1726-2016. The soil profile(s) encountered are provided in bore logs in **Appendix D**.
Soil sampling	During drilling, samples were obtained at the depths specified in the SAQP. To reduce the likelihood of cross contamination, soil samples were collected using new nitrile gloves and placed into laboratory prepared PFAS sample containers. All samples were filled to the top and securely sealed. The field quality assurance / quality control (QA/QC) samples comprised intra-laboratory duplicate samples, inter-laboratory duplicate samples and rinsate blanks.
Soil sample	During collection in the field, soil samples were placed in eskies kept cool with ice bricks prior to air transport to the laboratory. Samples were

Activity/Item	Details
preservation	submitted with chain-of-custody documentation to an accredited laboratory.
Decontamination procedures	The decontamination procedures were performed before initial use of re-useable equipment and after each subsequent use. All reusable sampling equipment was decontaminated between each sample by scrubbing in a solution of Liquinox and potable water before being rinsed in PFAS free distilled water. For each day of sampling, following decontamination procedures, a rinsate blank was completed by running laboratory prepared rinsate water over the reusable sampling equipment for collection directly into laboratory prepared sampling containers for analysis. At each sample location, a new set of disposable nitrile gloves was used to directly collect soil samples from the re-useable sampling equipment for placement into the laboratory prepared sampling containers.
Disposal of waste	Waste soil generated during the drilling was disposed of into two 205 L drum which were disposed off-site by Cleanaway.

4.3.2 Groundwater Investigation

The groundwater investigation methodology is described in **Table 7**.

Table 7 Groundwater Investigation Methodology

Activity	Details
Monitoring well installation	Monitoring well construction nominally comprised of a 50 mm diameter uPVC screen and plain casing with screw fittings installed in an approximately 150 mm diameter bore. Wells were installed to an approximate depth of 3 mbgl. Screen length varied between wells dependent on water strike. Screened sections were installed in a gravel filter pack to 0.5 m above the top of the screen and isolated with a 1 m thick bentonite seal. Each well was fitted with a flush mounted gatic and secured into position with concrete. A water tight enviro-cap was installed on the top of each well casing to prevent accidental blockage of the well.
Well development	Wells were developed following installation using a foot pump. The wells were purged until the extracted water was ‘clearing’ and field parameters were stabilised. Monitoring well construction details can be found in **Table T1, Appendix B**.
Well gauging	Monitoring wells were gauged using an oil/water interface probe. The results of groundwater level gauging are presented in **Table T2, Appendix B**. The field sheets and calibration certificates are provided in **Appendix E**.
Field Parameters	Groundwater physicochemical properties were measured in the field prior to sample collection using a calibrated YSI water quality meter. Groundwater pH, temperature, electrical conductivity, redox potential and dissolved oxygen concentrations were measured. Groundwater physicochemical parameters are presented in **Table T3, Appendix B**. Water quality meter calibration certificates are presented in **Appendix E**.
Groundwater sampling	The groundwater sampling procedure is described in detail in the SAQP (AECOM, 2019). Groundwater samples were collected from each monitoring well using a low flow bladder pump in accordance with Australian Standard AS5667.11 (1998) and the AECOM Standard Operating Procedure (SOP). Samples were obtained following stabilisation of field parameters and standing water level. The field QA/QC samples comprised intra-laboratory duplicate samples, inter-laboratory duplicate samples, rinsate blanks and trip blanks.
Sample preservation	During collection in the field, samples were placed into the appropriate laboratory-supplied containers and placed in an esky, which was kept cool with ice bricks. Samples were transferred to a clean fridge before being delivered to the lab via air freight. Samples were submitted with chain of custody documentation to an

Activity	Details
	accredited laboratory.
Decon-tamination procedures	The oil/water interface probe and bladder pump were decontaminated by scrubbing in a solution of Liquinox and potable water before rinsing with PFAS free distilled water between each groundwater well. A rinsate sample was collected from either the interface probe or bladder pump each day of sampling. Dedicated bladders, tubing and nitrile gloves were used for each well sampled.
Disposal of waste	Purged groundwater was disposed of into a 205 L waste drum, which was temporarily stored in an area nominated by Airservices. The drums were disposed of by Cleanaway.
Surveying	Surveying of newly installed groundwater wells was completed by Veris. The surveying report is presented in **Appendix F**.

4.3.3 Surface Water Investigation

The surface water sampling methodology is summarised in **Table 8**.

Table 8 Surface Water Investigation Methodology

Activity	Details
Surface water sampling	Surface water sampling was conducted in accordance with Australian Standard for Water Quality Sampling (AS 5567:1998). Samples (co-located with sediment samples) were collected from 13 locations (nine on-site and eight off-site). Eight on-site surface water samples were collected from different locations along the stormwater drainage swales and one on-site sample was collected from a drainage channel. The eight off-site samples (co-located with sediment and biota samples) were collected along Barron River/Trinity Bay. Off-site surface water samples were collected on two separate occasions to represent the flood and ebb of the tide. On-site surface water samples were collected by direct grab sampling using a sampling pole or by a gloved hand while off-site surface water samples were collected using a sediment sampler. Samples were collected from immediately below the water surface to minimise disturbance of the water column and to minimise suspension of sediment in the samples.
Collection of field physicochemical data	A calibrated YSI Quatro Pro Plus was used to measure physiochemical parameters by placing the probes in a sample of the surface water collected in a container. General observations of the surface water quality and flow were recorded. The field sheets are presented in **Appendix E**.
Sample preservation	During collection in the field, samples were placed into the appropriate laboratory-supplied containers and placed in an esky, which was kept cool with ice bricks. Samples were transferred to a clean fridge before being packaged up and sent to the lab via air freight. Samples were submitted with chain-of-custody documentation to an accredited laboratory.
Decontamination	The sampling pole was decontaminated by scrubbing in a solution of Liquinox and potable water before rinsing with PFAS free distilled water between sampling locations.

4.3.4 Sediment Investigation

The sediment sampling methodology is summarised in **Table 9**.

Table 9 Sediment Investigation Methodology

Activity	Details
Sediment sampling	On-site sediment samples (co-located with surface water samples) were collected using a gloved hand placing samples directly into laboratory sample jars. Off-site sediment samples were collected using a Van Veen Grab sampler. At each location the sample jar was filled to the top to ensure no headspace and the cap was immediately applied.
Sample preservation	Samples were placed into the appropriate laboratory-supplied containers Samples were stored in a clean fridge before being packaged up and sent to the lab via air freight. Samples were submitted with chain-of-custody documentation to an accredited laboratory.
Decontamination	A new pair of disposable nitrile gloves was used to collect each sediment sample to avoid the potential for cross contamination.

4.3.5 Biota Investigation

The biota sampling methodology is summarised in **Table 10**.

Table 10 Biota Investigation Methodology

Activity	Details
Biota sampling	Biota samples were collected by Blue Earth Environmental in accordance with their General Fisheries Permit (192540, dated 22 June 2017), issued under the Fisheries Act 1994. The permit allows '*the permit holder to take and possess up to 5 of each species, per site sampled, excluding species that are listed as 'no take' under the Fisheries Act 1994 or listed as 'threatened species' under the Environment Protection and Biodiversity Conservation Act 1999 or as 'endangered wildlife' under the Nature Conservation Act 1992 for the purpose of voucher specimens and tissue analysis.'* Biota samples were collected at four different locations along the Barron River. Boats were used to deploy mesh nettings. Observation on the number of target species and bycatch captured were recorded. Target specimens were retrieved from nets and euthanised by ice and slurry. Target specimen metrics (length, weight, sex etc) were recorded by Blue Earth Environmental. GPS readings were taken at each sampling location. Whole specimens were submitted to the laboratory for sample preparation (in accordance with AECOM instruction) and analysis. Edible portions were targeted for analysis (i.e. fish fillets and extracted meat from crabs). The Blue Earth Environmental biota sampling sheets are presented in **Appendix E**.
Collection of field physicochemical data	A calibrated Yeo-Kal multi-parameter water quality meter was used to measure physiochemical parameters (dissolved oxygen, electrical conductivity, pH, turbidity and temperature) at each sampling location. General observations of the water quality and flow were recorded. The field sheets are presented in **Appendix E**.
Sample preservation	Target specimens (whole) were placed in labelled zip lock bags and transported to the laboratory on ice in an esky. Samples were submitted with chain-of-custody documentation to an accredited laboratory.

4.4 Laboratory Analysis and Quality Assurance / Quality Control

A summary of samples analysed for this Investigation are shown in **Table 11**. The analysis was conducted by Australian Laboratory Services (ALS) (primary laboratory) and National Measurement Institute (NMI) (secondary laboratory).

Table 11 Summary of Laboratory Analyses – Primary Samples

Sample Media	Number of samples analysed for PFAS	Number of samples analysed for TRH/BTEXN	Number of samples analysed for metals	Number of samples analysed for faecal coliforms
Groundwater	20	-	-	-
Surface water	19	16	16	9
Soil	8	-	-	-
Sediment	22	15	15	-
Biota (Pikey Bream, Mud Crab, Oxeye Herring, Giant Leatherskin, Giant Trevally, Yellowfin Bream and Sicklefish)	16	-	-	-

4.4.1 Quality Assurance / Quality Control Sampling

Quality assurance / quality control (QAQC) samples analysed are summarised in **Table 12**.

Table 12 Number of QAQC samples analysed

Item	Primary	Duplicate	Triplicate	Rinsate
Soil / Sediment	30	4	3	6
Groundwater / Surface Water	39	5	5	
Biota	16	-	-	-

The QA/QC results and data validation summary are presented in **Appendix G**.

4.4.2 Data Quality Objectives and Analytical Data Validation

The *National Environment Protection (Assessment of Site Contamination) Measure (*as amended 2013) (ASC NEPM) Schedule B2 Guideline on-Site Characterisation specifies that the nature and quality of the data produced in an investigation should be determined by the data quality objectives (DQO). As referenced by the ASC NEPM, the DQO process is detailed in the United States Environmental Protection Agency (US EPA, 2006) *Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4 : EPA/240/B-06/001),* February 2006. The DQOs were specified within the SAQP and are presented in **Appendix G**.

AECOM has undertaken a review of the laboratory analytical results for quality control purposes; the results of the data validation process are presented in **Appendix G** and the laboratory quality control reports are included in **Appendix H**. In summary, while some non-conformances have been identified, these are considered of minor importance and it is concluded that the dataset presented in this report is suitable for use.

5.0 Assessment Criteria

5.1 Adopted Screening Criteria

Based on the Airport location, groundwater level and inferred groundwater flow direction results, groundwater encountered beneath the Airport is considered likely to discharge directly and / or indirectly to Barron River and Trinity Bay which is considered to be a mid-estuary setting that is moderately disturbed as indicated by Environmental Protection (Water) Policy 2009 Barron River Basin Environmental Values and Water Quality Objectives. In contract, these two large nearby water bodies may impede discharge, therefore causing groundwater to move up and down rather than laterally, it should also be noted that a saline wedge / intrusion zone may exist beneath the Airport and that this may impact the mobility of dissolved PFAS and therefore the geometry of a PFAS plume. This impact to groundwater discharge notwithstanding, the environmental values that are considered relevant and therefore adopted (refer to **Table 13**) should be suitably protective of aquatic ecosystems and primary recreational use (i.e. swimming). As the groundwater beneath the Airport was found to be brackish and the surface water bodies surrounding the Airport are estuarine, marine water investigation levels were selected as appropriate.

The contaminants of potential concern (COPC) investigated can be broadly split into two groups: PFAS and non-PFAS. PFAS was analysed in all media and non-PFAS was analysed in selected samples. The adopted investigation levels for PFAS are presented in **Table 13** and while the non-PFAS investigation criteria are presented in **Table 14**.

Table 13 Adopted investigation levels for PFAS

Media	Environmental Value	PFAS	Guideline Value
Soil	Industrial / commercial	PFOA	50 mg/kg
		Sum of PFHxS and PFOS	20 mg/kg
	Interim soil – ecological indirect exposure (Residential)	PFOS	0.01 mg/kg [A]
Groundwater	Drinking water	PFOA	0.56 µg/L
		Sum of PFHxS and PFOS	0.07 µg/L
Groundwater discharging to surface water / surface water	Aquatic ecosystem protection (Note that marine screening levels are in development[6] and as per PFAS NEMP (2018), freshwater screening levels have been used)[C]	PFOS	0.00023 µg/L or LOR[B]
		PFOA	19 µg/L[B]
	Recreational contact with waters	PFOA	5.6 µg/L 10 µg/L[F]
		Sum of PFHxS and PFOS	0.7 µg/L 2.0 µg/L[F]
Sediment	No applicable sediment guidelines are available for PFAS from PFAS NEMP (2018).		
Biota	Human health for consumption of finfish	PFOS	5.2 µg/kg[E]
	Interim Biota– ecological direct exposure for wildlife diet - Mammalian diet biota ww food	Sum of PFHxS and PFOS	4.6 µg/kg[G]

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[6] It is noted that the screening level are currently being developed for protection of marine environments for direct toxicity of exposed organisms (as discussed in CRC CARE Technical Report 43). It is noted that the proposed draft marine screening level for 99% species protection for slightly to moderately disturbed systems are higher than the freshwater screening levels.

Media	Environmental Value	PFAS	Guideline Value
	Interim Biota– ecological direct exposure for wildlife diet - Avian diet biota ww food	Sum of PFHxS and PFOS	8.2 µg/kg[G]

Notes:
A - NEMP (HEPA, 2018) interim ecological value for indirect exposure. This guideline is considered relevant due to the potential for secondary consumers (e.g. insectivorous birds and mammals) to forage in the area due to the open ground on the Site.
B – Giesy et al 2010 Giesy, J.P et al (2010) Aquatic Toxicology of Perfluorinated Chemicals in D.M. Whitacre (ed.), Reviews of Environmental Contamination and Toxicology, Reviews of Environmental contamination and Toxicology 202, 1-52.
C - 99% species protection level approach adopted for chemicals that bioaccumulate and biomagnify in wildlife. As the laboratory limit of reporting (LOR) for PFOS exceeds this screening level, a default 'detect' screening level has been adopted in this instance.
D – The laboratory limit of reporting (LOR) exceeds this screening level, therefore not considered for the purpose of this assessment.
E- Trigger value in FSANZ (2017)
F- Australian Government National Health and Medical Research Council (2019), Guidance on Per and Polyfluoroalkyl substances in Recreational Water
G - NEMP (HEPA, 2018) Interim Biota– ecological direct exposure for wildlife diet

Table 14 Adopted non-PFAS surface water and sediment investigation levels

Media	Environmental value	Rationale
Surface water	Protection of aquatic ecosystems	BTEXN and metal concentrations have been screened against the NEPM (2013) groundwater investigation levels (GILs) for marine water and Australia and New Zealand Quality Guidelines for Marine Water (ANZG, 2018). The GILs define acceptable water quality for environmental values including protection of marine water ecosystems.
	Protection of human health	Faecal coliforms concentrations have been screened against ANZECC (2000) guidelines for primary contact activities (i.e. swimming) and secondary contact activities (i.e. boating, fishing). The guidance identify that median concentrations should be compared to guideline values. E. Coli concentrations have been screened against water quality objectives for the Barron River Basin (drinking water) as specified in DEHP (2014).
Sediment	Human health- direct contact	Metal concentrations have been screened against the NEPM (2013) health investigation levels (HILs).
	Protection of aquatic ecosystems	Metals have been screened against the Australia and New Zealand Guidelines for Fresh and Marine Water Quality Toxicant default guideline values (ANZG, 2018) for sediment quality (NHMRC, 2018). Results are compared against the default guideline values (DGV) and upper guideline values (GV- high). The sediment DGVs indicate the concentrations below which there is a low risk of unacceptable effects occurring. The GV- high provide an indication of concentrations at which you might expect to observe toxicity-related adverse effects.

6.0 Results

6.1 Soil Conditions

The bore logs for the three new soil bores (BH01/GW08A, BH02/GW09 and BH03/GW10) drilled in May 2019 are shown in **Appendix D**. All soil bores were drilled to 3.0 mbgl. The soil conditions at these soil bore locations are summarised in **Table 15**.

Table 15 Summary of Soil Profile

Soil layer	Depth (mbgl)	Description
Fill layer	0 to 0.9	Silty sand with some gravel.
Natural soil layer	0.9 to 3.0	Silty and sandy clay in GW08A between 0.5 and 3.0 mbgl. Sand in GW09 between 0.8 and 3.0 mbgl. Sand in GW10 between 0.9 and 3.0 mbgl.

There was no visual or olfactory indication of contamination in the soil samples during the drilling. Soil conditions observed with previously reported observations.

6.2 Hydrogeology

6.2.1 Observations during Drilling

Groundwater was encountered within the natural soil layer in all three new soil bores. The depths of the groundwater strikes were between 1.5 and 2.2 mbgl as shown on the bore logs in **Appendix D**.

6.2.2 Groundwater Elevations and Groundwater Flow Direction

The 12 groundwater monitoring wells sampled during this investigation were gauged before groundwater samples were collected. The standing water levels (SWLs in metres below top of casing [mbtoc]) measured on an ebb tide (between high and low tide) were between 0.564 and 2.364 metres below top of casing (mbtoc). The groundwater elevations were between -0.251 and 1.34 m AHD. The SWLs and groundwater elevations are presented in **Table T2**, **Appendix B** and shown on **Figure F4**, **Appendix A**. The inferred groundwater contours and groundwater flow direction at the Airport are also shown on **Figure F4**, **Appendix A**. Across the central part of the Airport, groundwater is inferred to flow from west to east with flow in the northern portion of the Airport directed towards the northeast, towards the Barron River and flow in the southern portion of the Airport migrates towards the southeast. The groundwater elevations and direction of flow are consistent with previous investigations / assessments.

6.2.3 Water Quality Parameters

Table T3, **Appendix B** presents the field water quality parameter results for groundwater collected during the groundwater monitoring event. The raw data were recorded on the field sheets presented in **Appendix E**. A summary of the water quality results is presented in **Table 16**.

Table 16 Summary of Groundwater and Surface Water Quality Parameter Results

	Units	No of samples	Minimum	Maximum
pH	-	14	5.58	6.74
Temperature	ºC	14	25.4	27.7
Dissolved oxygen	mg/L	14	0.04	1.85
Oxidation reduction potential	mV	14	-65.2	409.6
Electrical conductivity	µS/cm	14	92	62,341
Total dissolved solids (TDS)	mg/L	14	59.8	40,522

The results indicate:

- pH in groundwater was slightly acidic to near neutral
- TDS and EC data indicates that groundwater ranges from fresh to saline across the Airport. Groundwater was fresh in seven monitoring wells (CA01, CA03, CA08, GW04, GW09, GW10, MW05), brackish in two monitoring wells (GW01, GW05) and saline in five monitoring wells (GW02, GW03, GW06, GW07, GW08A). There was no correlation between well proximity to Trinity Bay and TDS and EC readings. There was also no correlation with flow direction as samples from some of the monitoring wells closer to the river or bay recorded brackish water, while two of the monitoring wells located in the western portion of the Airport recorded saline water.
- Groundwater was moderately oxygenated in CA01, GW09, GW10 (1.3 to 1.9 mg/L) and poorly oxygenated in the samples from the other monitoring wells (<0.7 mg/L).
- Oxidation reduction potential was in a similar range for the majority of monitoring wells, between 136 and 410 mV indicating moderately oxidising conditions. Samples from three monitoring wells indicated more reducing conditions (GW01, GW06 and GW07 with -65 to 65 mV)

6.2.4 Groundwater Field Observations

There was no visual or olfactory indication of contamination in the monitoring wells during the groundwater monitoring, including no identification of phase separated hydrocarbons (PSH), foaming or odours.

6.3 Surface Water

Table T4, **Appendix B** presents the field water quality parameter results for surface water collected during the monitoring event at on-site stormwater drains and drainage channels and off-site at sampling locations in the Barron River. The raw data were recorded on the field sheets presented in **Appendix E**. A summary of the water quality results is presented in **Table 17**.

Table 17 Summary of Groundwater and Surface Water Quality Parameter Results

	Units	Surface water on-site	Surface water off-site (Barron River)
pH	-	7.03 – 8.51	6.7 – 7.9
Temperature	ºC	19.2 – 26	26.2 – 31.0
Dissolved Oxygen	mg/L	3.89 – 10.51	5.1 – 10.1
Electrical Conductivity	µS/cm	1464 – 43,396	44.8 – 44,300
Total dissolved solids	mg/L	952 – 24,346	29 – 28,795

For samples collected from on-site and off-site locations, the results indicate surface water was near neutral to slight alkaline, moderately to well oxygenated and brackish to saline.

6.4 Analytical Results- PFAS

6.4.1 Soil

The soil analytical results are presented in **Table T5, Appendix B**. The laboratory analytical reports are presented in **Appendix H**. PFAS was detected in all six soil samples analysed. A summary is presented in **Table 18**. There were no exceedances of the human health or ecological guideline values for industrial land use in the soil samples analysed.

The maximum sum of PFAS concentrations reported was 0.0083 mg/kg in the sample from BH02 at 0.5 mbgl.

Table 18 Summary of PFAS Analytical Results in Soil Samples

Compound	No. of samples analysed	No. of samples >LOR*	Maximum concentration (mg/kg)	No. of samples exceeding human health IL	No. of samples exceeding of ecological IL
PFHxS+PFOS	6	6	0.0083[a]	0	No guideline
PFOS	6	5	0.0083[a]	No guideline	0
PFOA	6	1	0.0002	0	No guideline
Sum of PFAS	6	6	0.0083[a]	No guideline	No guideline

Note: *LOR is limit of reporting and is 0.0002 mg/kg for PFHxS+PFOS, PFOS and PFOA.
[a] Maximum concentration was from the duplicate sample of BH02, IL is investigation level

6.4.2 Groundwater

The groundwater analytical results for samples collected from monitoring wells are presented in **Table T6, Appendix B.** The laboratory analytical reports are presented in **Appendix H**. A summary of an assessment of the results with human health guideline values is presented in **Table 19** below.

Table 19 Assessment of Groundwater Results with Human Health Guideline Values

Compound	No. of samples analysed	No. of samples >LOR*	Maximum concentration (µg/L)	No. of samples exceeding drinking water guideline value	No. of samples exceeding recreational water guideline value (NEMP, 2018)
PFHxS+PFOS	14	13	122	8	5
PFOA	14	9	5.66	2	1

The groundwater analytical results for sum of PFHxS and PFOS concentrations are presented on **Figure F5, Appendix A**. There were eight exceedances of the human health guideline values for drinking water in the groundwater samples, with the maximum sum of PFHxS and PFOS concentration (122 µg/L) detected in GW02, located adjacent to the ARFFS Fire Station. The other exceedances were in groundwater samples from monitoring wells close to, or down-gradient of the FTG (CA01, CA03, CA08, GW03, GW08A and MW05) and in GW01, located adjacent to the ARFFS Workshop. Five of these samples (CA01, CA03, MW05, GW01 and GW02) also exceeded the recreational water guideline value.

PFOA concentrations in samples from GW02 and CA03 also exceeded the drinking water guideline value with the sample from GW02 slightly exceeding the recreational water guideline value.

There were exceedances of the ecological guideline value for 99% species protection for marine water for PFOS in all 12 samples where PFOS was detected above the limit of reporting. There were no exceedances of the adopted ecological guideline values for PFOA.

6.4.3 Surface water

Co-located sediment and surface water samples were collected during the sampling event (within the Barron River/ Trinity Bay). The on-site and off-site surface water results are presented in **Table T7, Appendix B**. The laboratory analytical reports are presented in **Appendix H**. The surface water analytical results for sum of PFHxS and PFOS concentrations are presented on **Figure F6, Appendix A**. The results are described in the following subsections.

6.4.3.1 On-site surface water samples

PFAS was detected in all nine on-site surface water samples with 16 different compounds identified. Sum of PFHxS and PFOS concentrations in three of the samples, SW05, SW06 and SW09 exceeded the NEMP (2018) health guideline value for recreational water. All three of these samples were collected from water pooled in the concrete stormwater drain that runs from the ARFFS Fire Station and discharges into the drainage channel. The maximum sum of PFHxS and PFOS concentration (5.5 µg/L) was detected in SW05 which is the closest sample to the ARFFS Fire Station. Fluorotelomers (6:2 FtS and 8:2 FtS) and FOSA were also detected in these samples.

PFOS concentrations in all ten surface water samples exceeded the NEMP (2018) guideline value for 99% protection of freshwater and marine species.

Concentrations of PFOA did not exceed the NEMP (2018) recreational water or ecological marine guideline values in any of the samples.

6.4.3.2 Off-site surface water samples

PFAS was detected in all eight off-site surface water samples collected form the Barron River with sum of PFHxS and PFOS concentrations between 0.0004 and 0.024 µg/L. The maximum concentration was recorded at SW11 collected during the flood of the tide. PFOS in all eight samples exceeded the NEMP (2018) guideline value for 99% protection of freshwater and marine species. Concentrations of PFOA did not exceed the NEMP (2018) recreational water or ecological marine guideline values in any of the samples.

A comparison of the sum of PFHxS and PFOS and PFOA concentrations in water ebbing and flowing along the Barron River are presented in **Table 20**.

Table 20 Summary of Sum of PFHxS and PFOS and PFOA concentrations in samples from Barron River

Sampling Location	Sum of PFHxS and PFOS (µg/L)		PFOA (µg/L)	
	Ebbing water	Flowing water	Ebbing water	Flowing water
SW10	0.0004	0.0248	<0.0005	0.0017
SW11	0.0038	0.0367	<0.0005	0.0021
SW12	0.001	0.0112	<0.0005	0.0008
SW13	0.0029	0.0113	<0.0005	0.0008

Note: Ebb is the outgoing phase when the tidal movement of the Barron River is towards Trinity Bay, Flow is the incoming phase when the tidal movement of the Barron River is from Trinity Bay

The results indicate that PFAS concentrations are relatively higher in the Barron River during the flow phase when water is moving from Trinity Bay into the Barron River.

6.4.4 Sediment

The on-site and off-site sediment results are presented in **Table T8, Appendix B** with PFHxS and PFOS results presented on **Figure F7, Appendix A**. The laboratory analytical reports are presented in **Appendix H**.

6.4.4.1 On-site sediment samples

There are currently no applicable screening criteria for PFAS in sediment. PFAS was detected in all ten sediment samples collected and analysed. PFAS concentrations in three of the samples, SS05, SS06 and SS09 (in the range 0.2 to 1.8 µg/L sum of PFHxS and PFOS) were elevated relative to the other seven samples (<0.005 µg/L sum of PFHxS and PFOS). PFAS was also elevated in the surface water samples that were co-located with SS05, SS06 and SS09 and all these samples were collected from the concrete stormwater drain that runs from the ARFFS Fire Station to the drainage channel.

6.4.4.2 Off-site sediment samples

Trace levels of PFAS concentration were reported in off-site sediment samples ranging between 0.0002 and 0.0004 mg/kg with PFOS the only compound detected. There are currently no applicable screening criteria for PFAS in sediment.

6.4.5 Biota

The biota analytical results are presented in **Table T9, Appendix B** with PFHxS and PFOS results presented on **Figure F8** in **Appendix A**. PFAS was detected in twelve of the 16 samples, with detections at all four sampling locations. PFOS was the only compound detected in the biota and all concentrations were < 4 micrograms per kilogram (µg/kg). There was no exceedance of the FSANZ health trigger levels for consumption of finfish (5.2 µg/kg).

6.5 Analytical Results- Non PFAS

6.5.1 Groundwater

A summary of the major ions and nutrients results is presented in **Table 21** below. Chloride and sulfate in seven and five groundwater samples respectively exceeded the NHRMC ADWG (2018) aesthetic values. The full results are presented in **Table T10, Appendix B**.

Table 21 Summary of groundwater major ions and nutrients analytical results

Ion	Units	No. of samples	No. > LOR	Minimum	Maximum
Reactive Phosphorus (as P)	mg/L	14	9	0.02	1.18
Bicarbonate Alkalinity as CaCO3	mg/L	14	14	10	1210
Carbonate Alkalinity as CaCO3	mg/L	14	0	<LOR	<LOR
Hydroxide Alkalinity as CaCO3	mg/L	14	0	<LOR	<LOR
Total Alkalinity as CaCO3	mg/L	14	14	10	1210
Hardness	mg/L	14	14	13	11100
Calcium	mg/L	14	14	2	785
Magnesium	mg/L	14	14	2	2220
Potassium	mg/L	14	14	2	563
Sodium	mg/L	14	14	11	15900
Sulfate (as SO4-)	mg/L	14	13	5	0.5
Chloride	mg/L	14	14	9	22600
Fluoride	mg/L	14	9	0.2	1.2
Total anions	meq/L	14	14	0.74	791
Total cations	meq/L	14	14	0.86	928

6.5.2 Surface Water

6.5.2.1 On-Site Samples

Total recoverable hydrocarbons, metals, major ions and nutrients results for on-site surface water samples are presented in **Table T11, Appendix B**.

Metals

Due to the high hardness of surface water in the estuarine setting (i.e. more than 30 mg/L), the default ANZG (2018) guidelines for protection of marine water ecosystems for cadmium, chromium, lead, nickel and zinc have been modified for hardness using the *Revised method for deriving Australian and New Zealand water quality guideline values for toxicants, October 2018.* Arsenic, copper and mercury guideline values have not been modified as hardness has either no or limited effects on these metals.

Assessment of the metals analytical results with the adopted investigation levels indicated the following exceedances:

- Copper in SW07 (89 µg/L), SW08A (2 µg/L) and SW09 (6 µg/L) exceeded the guideline value of 1.3 µg/L
- Nickel in SW07 (63 µg/L) exceeded the hardness modified guideline value of 55 µg/L
- Zinc in SW07 (726 µg/L) exceeded the hardness modified guideline value of 117 µg/L.

Total Recoverable Hydrocarbons

Total recoverable hydrocarbons were detected in three of the four samples analysed:

- SW06 had 150 µg/L TRH C_{16}-C_{34} fraction (F3)
- SW07 had 2,230 µg/L TRH C_{10}-C_{40}
- SW09 had 410 µg/L TRH C_{16}-C_{40}

There are no screening guidelines for total recoverable hydrocarbons in surface water.

BTEXN compounds were not detected above the laboratory limit of reporting in the four samples analysed and there were no exceedances of the NEPM GILs.

Major Ions and Nutrients

A summary of the major ion and nutrient results are presented in **Table 22**. There were no relevant screening levels for these parameters.

Table 22 Summary of surface water major ions and nutrients analytical results

Ion	Units	No. of samples	No. > LOR	Minimum	Maximum
Reactive Phosphorus (as P)	mg/L	9	3	0.01	0.09
Bicarbonate Alkalinity as CaCO3	mg/L	9	9	16	424
Carbonate Alkalinity as CaCO3	mg/L	9	0	<LOR	<LOR
Hydroxide Alkalinity as CaCO3	mg/L	9	0	<LOR	<LOR
Total Alkalinity as CaCO3	mg/L	9	9	16	424
Hardness	mg/L	9	9	160	7370
Calcium	mg/L	9	9	21	478
Magnesium	mg/L	9	9	26	1500
Potassium	mg/L	9	9	21	459
Sodium	mg/L	9	9	270	12600
Sulfate (as SO4-)	mg/L	9	9	73	3060
Chloride	mg/L	9	9	480	18800
Fluoride	mg/L	9	9	0.1	0.8
Total anions	meq/L	9	9	16.2	596
Total cations	meq/L	9	9	15.5	707

6.5.2.2 Off-Site Samples

Metals, petroleum hydrocarbons, and bacterial results for off-site surface water samples from the Barron River are presented in **Table T11**, **Appendix B**.

Metals

With the exception of arsenic and chromium, no metals were detected above the laboratory limit of reporting in samples from the Barron River. Arsenic was detected in samples from all four locations SW10-SW13) at or close to the limit of reporting (1 to 2 µg/L). Chromium was detected in samples from SW10 at concentrations equal at the limit of reporting (1 µg/L). There were no exceedances of the NEPM GILs for the protection of marine water ecosystems.

Total Recoverable Hydrocarbons

Total recoverable hydrocarbons and BTEXN compounds were not detected in any of the samples collected and analysed from the Barron River (SW10 to SW13) and there were no exceedances of the NEPM GILs.

E. Coli and Faecal Coliform

Samples from the Barron River were analysed for bacteria indicator organisms to assess water quality. It should be noted that these are not contaminants associated with Airport operations. A summary of the E. Coli and faecal and total coliform results is presented in **Table 23**.

Table 23 Summary of E. Coli and Coliform Analytical Results

Ion	Units	No. of samples	No. > LOR	Minimum	Maximum	Mean
E. Coli	CFU/100 mL	9	9	30	320	114
Faecal Coliform	CFU/100 mL	9	9	130	560	268
Total Coliform	CFU/100 mL	9	9	730	5700	2440

The ANZECC (2000) guideline level for faecal coliforms in recreational water is 150 cfu/mL (median) for primary contact (i.e. swimming, surfing etc.) The median results for the nine samples collected from the Barron River is 200 cfu/mL indicating the concentration of faecal coliform exceeded the guideline value. The median concentration for the nine samples does not exceed the guideline value for secondary contact (i.e. boating).

The mean concentration of E. Coli (114 cfu/100 mL) exceeded the water quality objective for the Barron River Basin. The mean concentration is also noted to be above the ADWG (2016) guideline value for drinking water.

6.5.3 Sediment

6.5.3.1 On-Site

Metals, total recoverable hydrocarbons, and major ions and nutrient results for on-site sediment samples are presented in **Table T12**, **Appendix B**.

Metals

Assessment of the metals analytical results with the adopted investigation levels (ANZG 2018) indicated the following exceedances of the ANZG (2018) default guideline values for protection of marine water ecosystems. Nickel and zinc in the sample from SS09 marginally exceeded the ANZG (2018) GV-high levels. All other metal concentrations were below the GV-high.

- Arsenic in SS06 (28 mg/kg) and SS09 (54 mg/kg)
- Copper in SS08A (71 mg/kg)
- Mercury in SS08A (0.4 mg/kg)
- Nickel in SS09 (62 mg/kg)

- Zinc in SS09 (431 mg/kg)

Total Recoverable Hydrocarbons

Total recoverable hydrocarbons were detected in all four samples analysed:

- SS06 had 260 mg/kg TRH C_{16}-C_{34} and 200 mg/kg TRH C_{34}-C_{40}
- SS07 had 110 mg/kg TRH C_{16}-C_{34} and 110 mg/kg TRH C_{34}-C_{40}
- SS08A had 140 mg/kg TRH C_{16}-C_{34} and 110 mg/kg TRH C_{34}-C_{40}
- SS09 had 130 mg/kg TRH C_{10}-C_{16}, 970 mg/kg TRH C_{16}-C_{34} and 420 mg/kg TRH C_{34}-C_{40}

There are no screening guidelines for TRH in sediment.

BTEXN compounds were not detected above the laboratory limit of reporting in the four samples analysed.

Major Ions and Nutrients

A summary of the major ion and nutrient results are presented in **Table 22**. There were no relevant screening levels for these parameters.

Table 24 Summary of sediment - major ions and nutrients analytical results

Ion	Units	No. of samples	No. > LOR	Minimum	Maximum
Reactive Phosphorus (as P)	mg/kg	9	4	<0.1	3.0
Bicarbonate Alkalinity as CaCO3	mg/kg	9	9	9	1790
Carbonate Alkalinity as CaCO3	mg/kg	9	0	<5	<5.0
Total Alkalinity as CaCO3	mg/kg	9	9	9	1790
Calcium	mg/kg	9	8	<10	580
Magnesium	mg/kg	9	8	<10	920
Potassium	mg/kg	9	9	20	450
Sodium	mg/kg	9	9	330	6200
Sulfate (as SO4-)	mg/kg	9	9	80	1670
Chloride	mg/kg	9	9	490	10300
Fluoride	mg/kg	9	9	1	7

6.5.3.2 Off-Site

Metals and petroleum hydrocarbons results for off-site sediment samples collected from the Barron River are presented in **Table T12**, **Appendix B**.

Metals

Assessment of the metals analytical results with the adopted investigation levels (ANZG, 2018) sediment samples indicated one exceedance. This was arsenic (22 mg/kg) which marginally exceeded the ANZG (2018) DGV (20 mg/kg). There were no exceedances of the ANZG (2018) GV-high.

Total Recoverable Hydrocarbons

Total recoverable hydrocarbons were detected in four samples:

- SS11 had 100 mg/kg TRH C_{16}-C_{34}
- SS12 had 50 mg/kg TRH C_{10}-C_{16}
- PW10 had 50 mg/kg TRH C_{10}-C_{16}

- PW13 had 80 mg/kg TRH C_{16}-C_{34} and 150 mg/kg TRH C_{34}-C_{40}

There are no screening guidelines for total recoverable hydrocarbons in sediment.

BTEXN compounds were not detected above the laboratory limit of reporting in the four samples analysed.

7.0 Discussion

7.1 Geological and Hydrogeological Conditions

7.1.1 Soil Conditions

Based on the lithology recorded in the bore logs from GHD (2018b), the subsurface lithology beneath the Airport generally comprises fill consisting of sand, overlying clay. The soil conditions in the three new bores, which were located adjacent to the eastern boundary in the northern portion of the Airport was different as sand was present beneath the fill. This may indicate sand is a more dominant soil type in the shallow ground in areas of the Airport closer to the depositional systems of the Barron River and Trinity Bay. The absence of clay in the area of the soil bores implies that retardation of PFAS contamination would be less in this part of the Airport.

7.1.2 Hydrogeology

Measured groundwater elevations and flow direction were consistent with the findings of the previous groundwater investigations (GHD, 2018b) with groundwater generally flowing from the west to east and locally flowing to the north-east towards the Barron River, in the northern portion of the Airport. Review of historical bore logs indicates groundwater strikes were in the clay beneath the fill at the source areas. Previous reports (GHD, 2018a) have indicated sand is also present as a dominant soil type at the Airport and this has been identified in bores GW08 to GW10. As clay generally has low hydraulic conductivity, where present, it is likely to limit vertical and lateral migration of PFAS. As AFFF were released to surface, PFAS contamination is considered more likely to be present in fill material with the clay material retarding migration. The potential for perched water to be present in the fill layer is not known. Underground service runs may create preferential pathways for contaminant migration in source areas through areas where clay is the main soil type present.

It is noted that the bore logs for GW01 and GW02, which are present within, or close to potential source areas, were screened across both fill and clay strata (as shown in logs in GHD, 2018b). Other monitoring wells are screened within the natural clay only. (Note that AECOM has not reviewed logs for historical bores CA01, CA03 and MW05 which also have elevated PFAS concentrations.) The initial groundwater strikes in GW01 (2.0 mbgl) and GW02 (2.5 mbgl) indicate water was confined within the clay. Fill is present to 1.5 mbgl (at GW01) and to 2.0 mbgl (at GW02) with depth to water in June 2019 at 1.0 and 1.3 mbgl at GW01 and GW02 respectively.

As higher PFAS concentrations in groundwater at the Airport were detected in monitoring wells GW01 and GW02, it is considered possible that the elevated PFAS concentrations may be due to water being in contact with fill materials, which may contain secondary soil sources of PFAS. The elevated concentrations detected in groundwater in GW01 and GW02 (and historical monitoring bores) could potentially be related to the construction of these monitoring wells.

It is noted that tidal influence of marine water may impede the lateral migration of the PFAS plume, and prevent migration into Trinity Bay, however further monitoring of groundwater and surface water is required to support this relationship.

7.1.3 Assessment of major ions

A chart showing the major ion content of the groundwater and on-site surface water samples is shown in **Chart 1** below.

The range of compositions (sodium chloride, calcium/magnesium bicarbonate and sulphate) reported in the groundwater samples indicate ingress of seawater and potential rainfall recharge, as expected in shallow estuarine deposits.

The more tightly defined compositions primarily of sodium chloride reported in the surface water samples may potentially indicate that the surface water is impacted by seawater (i.e. wash over into the drains).

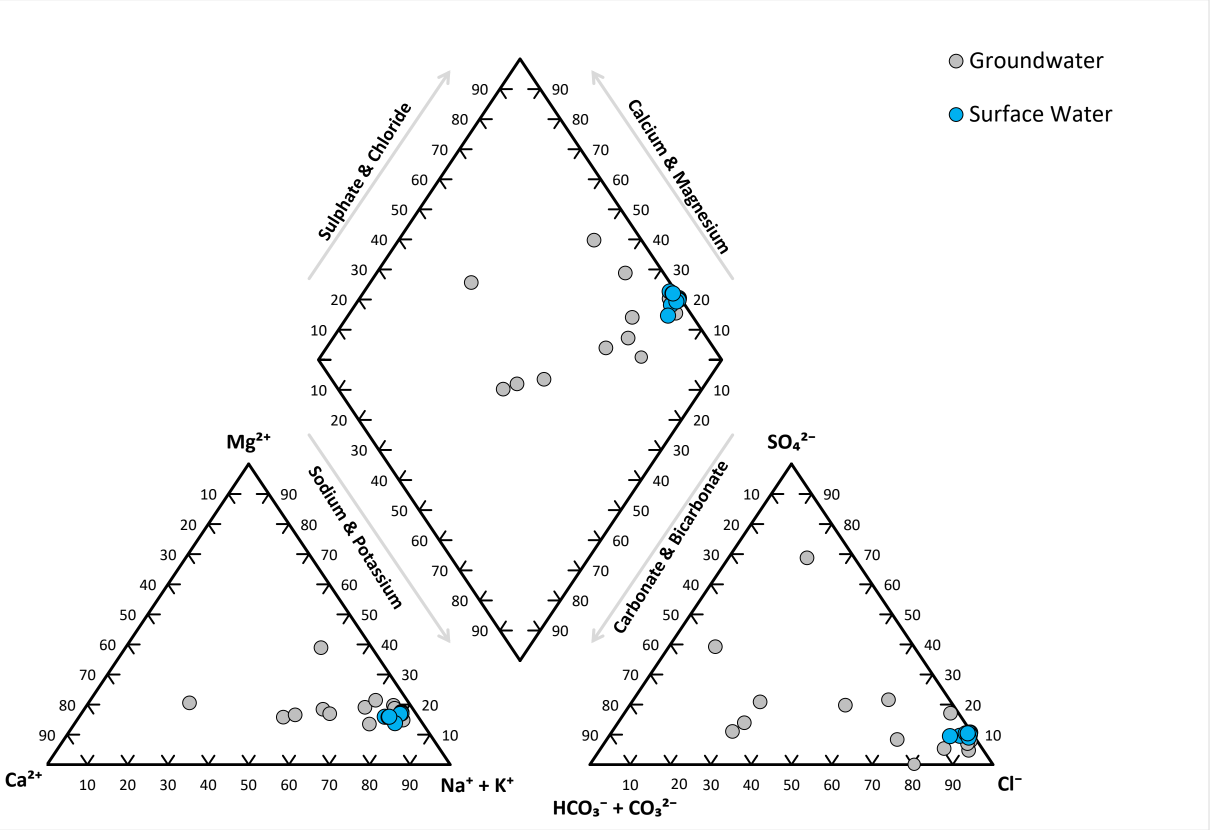

Chart 1 **Piper plot showing geochemistry of groundwater and surface water samples**

7.2 Soil Analytical Results

The three soil bores drilled as part of this Investigation were located along the eastern Airport boundary in the northern portion of the airport at distance from the potential primary source areas identified in the PSI (GHD, 2018a). The locations of these soil bores were selected to permit installation of three monitoring wells to evaluate groundwater.

The PFAS concentrations detected in shallow soil samples from these soil bores were generally close to the laboratory limits of reporting. These results do not indicate potential sources areas at the locations of the soil bores. In comparison, a review of the historical data set of soil bores from elsewhere on airport shows a strong correlation between areas of legacy AFFF discharge (primary source) and detected PFAS concentrations in soil.

7.3 Groundwater Analytical Results

Elevated PFAS concentrations in groundwater have been detected adjacent to the current ARFFS Fire Station (GW02), the former ARFFS Fire Station (GW01) and the FTG (CA03 and MW05). Dissolved PFAS concentrations in down-gradient locations reported much lower concentrations. For example, monitoring wells GW05, GW06, GW08A, GW09 and GW10 are considered to be hydraulically down-gradient of the ARFFS Fire Station and FTG and PFAS concentrations were nearing the laboratory limit of reporting (LOR) and/or were orders of magnitude lower. GW08A, located hydraulically down-gradient (north east) of the FTG recorded a sum of PFHxS and PFOS concentration of 0.25 µg/L. These results indicate PFAS contamination in groundwater is not laterally extensive, which is considered to reflect the clay soil present underlying the source areas, which has low hydraulic conductivity and potentially retards contaminant migration.

Based on the clay soil conditions, tidal influence of nearby marine environments and the distribution of groundwater PFAS results shown in **Figure F5**, **Appendix A**, it is possible that the extent of groundwater PFAS contamination is localised and relatively stable to the area of the three main source areas. Similar PFAS signatures for each of the main source areas provide an additional line of evidence that PFAS impact is localised. However, additional groundwater data from local down-gradient areas would be required to confirm this. Groundwater PFAS concentrations along the Airport boundaries are noted to be below guideline values for recreational water indicating PFAS concentrations in groundwater discharging into the Barron River are not likely to exceed the guideline value.

The extent of PFAS up-gradient of two of the three main source areas (FTG and ARFFS Fire Station) is indicated by the relatively lower concentrations of PFAS in groundwater in up-gradient monitoring wells CA08 and GW03, which were at least two orders of magnitude lower relative to the maximum concentration recorded in wells close to these source areas. Monitoring well CA08, located in the southwestern corner of the FTG had 0.27 µg/L sum of PFHxS and PFOS. Monitoring well GW03, located to the west of the ARFFS Fire Station had 0.30 µg/L sum of PFHxS and PFOS.

PFAS concentrations in groundwater in monitoring wells GW05 and GW06, which are located hydraulically down-gradient of areas used for historical firefighting training in the central and eastern portions of the Airport, are relatively low (less than 0.02 µg/L sum of PFHxS and PFOS) indicating it is unlikely that there is significant residual PFAS mass associated with these former training areas.

On-site groundwater results in 2019 were generally consistent with (i.e. in similar magnitude) and/or lower than previous results obtained in 2014 and 2017 (where results were available). Consistency in the PFOS, the dominant PFAS identified across the Airport, concentrations detected over the last five years support the hypothesis that the groundwater PFOS plume is relatively mature and stable.

A summary of the historical results for PFOS are shown in **Table 25**. As there are only two PFAS results available in each monitoring well, it is not possible to assess trends in concentration. It is noted that sampling has occurred in the same time of the year (end of the wet season) in 2014, 2017 and 2019, therefore it is not possible to evaluate the potential seasonal effects on groundwater results.

Table 25 Summary of groundwater analytical results: 2014 to 2019

Monitoring well	PFOS Concentration (µg/L)		
	May 2014	May 2017	June 2019
CA03	4.6	-	33.6
CA08	1.8	-	0.16
GW01	-	29.6	13.3
GW02	-	101	70.0
GW03	-	0.14	0.03
GW04	-	0.03	0.005
GW05	-	0.19	<0.002
GW06	-	0.02	0.014
GW07	-	<0.05	0.045

7.4 On-site Surface Water and Sediment Analytical Results

7.4.1 PFAS

Elevated PFAS was detected in the three surface water and sediment sampling locations along the concrete stormwater drain between the ARFFS Fire Station and the discharge point into the drainage channel. The maximum surface water sum of PFHxS and PFOS concentrations was 5.5 µg/L in SW05, the maximum sediment sum of PFHxS and PFOS concentration was 1.8 mg/kg in SS06). The samples of water collected were from stagnant water within the stormwater drain and the source of PFAS in the water could be from leaching of the sediment within the stormwater drain. Concentrations are noted to decrease with increased distance from the primary source (ARFFS Fire Station). The water sample collected from the drainage channel downstream of the position where the drain discharges (SW08A) recorded much lower concentrations of PFAS (0.06 µg/L sum of PFHxS and

PFOS). The drainage channel sampling point was in an area subject to tidal changes as the tidal gates were open at the time of sampling. The result may indicate attenuation of PFAS due to the influence of tidal dilution.

Samples SW07 and SW04 were collected from a separate concrete stormwater drain to the north which runs parallel to the channel. Relatively minor PFAS impacts were detected in stagnant water at these locations with up to 0.3 µg/L sum of PFHxS and PFOS at SW04. The PFAS concentrations may be associated with leaching of PFAS from an area historically used for firefighting training in the northwestern portion of the Airport.

Samples SW03/SS03 were collected from a stormwater drain adjacent to an area historically used for firefighting training in the central northern portion of the Airport. Relatively low concentrations of PFAS were detected (0.04 µg/L sum of PFHxS and PFOS in surface water and 0.002 mg/kg sum of PFHxS and PFOS in sediment). This may indicate relatively minor residual PFAS impacts as a result of firefighting training in this portion of the Airport.

Trace concentration were reported in surface water sampling locations in the southern and eastern portion of Airport (SW01 and SW02) with 0.01 µg/L sum of PFHxS and PFOS detected in surface water and up to 0.0008 mg/kg detected in sediment.

Lateral migration of PFAS across and from the Airport via the drainage system is apparent. However, decreasing PFAS concentrations with increased distance from the main source areas is observed. The drainage channel which is connected to the Barron River is affected by tidal flows, so PFAS discharged into the channel will be attenuated by tidal dilution.

7.4.2 Metals

Some heavy metals (copper, nickel and zinc) have been detected in excess of the ANZG (2018) guideline values (including modifying due to hardness where relevant) in surface water samples collected from the stormwater drains in the northern portion of the Airport. This may reflect historical activities and operations on-site. As metal concentrations in surface water samples did not exceed NEPM GILs in any of the samples collected in the Barron River, it is considered unlikely that there are unacceptable risks to the Barron River posed by the elevated heavy metals detected.

7.4.3 Total Recoverable Hydrocarbons

Total recoverable hydrocarbons, predominantly TRH C_{16}-C_{34} were detected in surface water samples collected from three locations along the concrete stormwater drains in the northwestern portion of the Airport (SW06, SW07 and SW09). The highest concentration was detected in SW07, which had 1,780 µg/L TRH C_{16}-C_{34}. Total recoverable hydrocarbons were also detected in the co-located sediment samples at these three locations and also from SS08A. The highest concentration was detected in SS09, which had 970 µg/L TRH C_{16}-C_{34}. Due to the estuarine setting, there is the potential for the hydrocarbons concentrations to be due to the presence of natural hydrocarbons in organic matter rather than fuel spillage. The non-detection of BTEXN compounds in the samples provides a line of evidence for the presence of natural hydrocarbons. Further sampling and analysis using silica gel clean-up would be required to confirm the nature of the hydrocarbons.

7.5 Off-Site Biota, Surface Water and Sediment Analytical Results

7.5.1 PFAS

7.5.1.1 Assessment of health risks

Off-site biota, sediment and surface water analytical results for samples collected from the Barron River are not considered to indicate an adverse risk to human health from PFAS for the following reasons:

- No exceedance of the FSANZ (2017) finfish trigger values for PFAS in any of the 16 biota samples analysed
- PFAS concentrations in eight surface water samples were below NEMP (2018) recreational water guideline values, which given the saline quality of the water is the most relevant guideline. It is noted, however, that all eight samples were also below the NEMP (2018) drinking water guidelines.

- PFAS concentrations in sediment samples were close to the laboratory limit of reporting.

It is noted that the reported PFAS concentrations in surface water were relatively higher during flow conditions compared to ebbing water (the incoming waters potentially preventing the discharge of PFAS into the river). This may possibly indicate the presence of an off-site source (potentially the wastewater treatment plant) of PFAS, which enters Barron River with the incoming tide.

7.5.2 Assessment of risk to aquatic receptors

For the assessment of estuarine water, ANZECC (2000) identifies that the lower of marine or freshwater criteria should be adopted. While the available scientific research indicates that PFAS may have lower toxicity in marine water compared to freshwater, there are fewer data available and so at this time, the freshwater screening values have been adopted as interim values for the assessment of marine ecosystems. The HEPA (2018) NEMP advises that freshwater values are to be used on an interim basis until final marine guideline values can be set, using the nationally-agreed process under the Australian and New Zealand Guidelines for Fresh and Marine Water Guidelines. The water quality guidelines advise that the 99% level of species protection be used for chemicals that bioaccumulate and biomagnify in wildlife when assessing ‘slightly to moderately disturbed’ systems where local data are lacking on bioaccumulation effects.

It is recognised that exceedance of the HEPA (2018) guideline level for PFAS in surface water (i.e. the 99% species protection level) does not necessarily mean an unacceptable risk is present and environmental harm is being caused. Exceedance of the NEMP (HEPA, 2018) guideline levels are therefore used to guide whether further assessment is required.

It is noted that recently published ecological research (reported in Batley et al (2018) *Application of revised methodologies for default guideline value derivations: PFOS in freshwater*, presented at the Society of Environmental Toxicology and Chemistry (SETAC) scientific conference in November 2018) suggests a draft revised 99% species protection criterion of 0.051 µg/L for PFOS. AECOM understands that this criterion is currently subject to further review to include additional data from recently published scientific research. Notwithstanding this limitation, it is considered that this draft guideline value can be used to assess the potential significance of the surface water concentrations present at the Airport.

The maximum concentration of PFOS detected in surface water samples collected from the Barron River was 0.024 µg/L, which is approximately 50% of the Batley et al (2018) screening level. Based on non-exceedance of the screening level, the risk to aquatic ecosystems in the Barron River is considered likely to be acceptable and further assessment is not warranted. The sample from the drainage channel on-site (SW08) marginally exceeded the Batley et al screening level. Due to the marginal exceedance, and as this channel is connected to the Barron River, the risk to aquatic ecosystems in the drainage channel is considered acceptably low.

7.5.3 Total Recoverable Hydrocarbons

No total recoverable hydrocarbons or monoaromatic hydrocarbon compounds (i.e. BTEXN) were detected in water samples from the Barron River. Some hydrocarbons were detected in one of the sediment samples (150 µg/L TRH C_{16}-C_{34}). Hydrocarbon concentrations were equal to the laboratory limit of reporting in three other sediment samples. Due to the estuarine setting, there is the potential for the hydrocarbons concentrations to be due to the presence of natural hydrocarbons from organic matter rather than a manmade source such as fuel spillage. The non-detection of monoaromatic hydrocarbons the samples provides a line of evidence for the presence of natural hydrocarbons. Further sampling and analysis using silica gel clean-up would be required to confirm the nature of the hydrocarbons.

7.5.4 E.Coli and Faecal Coliforms

Samples from the Barron River were analysed for bacteria indicator organisms to assess water quality. It should be noted that these are not contaminants associated with Airport operations. The median concentration of the nine samples from the Barron River analysed for faecal coliform exceeded the guideline level for primary contact. It is noted that the guidance (ANZECC 2000) identifies that the median concentration should be undertaken over the bathing season so further work would be required to assess the suitability of the water in the Barron River for recreational uses.

8.0 Conceptual Site Model - PFAS

8.1 Introduction

8.1.1 Purpose

The purpose of the CSM is to provide an understanding of the nature and extent of contamination impacts and the migration mechanisms, and the exposure pathways by which identified receptors may be exposed to contamination from the Investigation areas. The CSM also serves as a framework to assess risks to human health and ecological receptors, and assists in identifying uncertainties and data gaps. A preliminary CSM was developed as part of the PSI (GHD, 2018b) and refined with the interim risk assessment (AECOM, 2018b). The CSM has been updated based on the findings of this Investigation.

8.1.2 Definition of source-pathway-receptor linkages

In accordance with national guidance on assessment of contamination (NEPM, 2013), potential risks to receptors are evaluated based on three components:

- **Source**: A potentially hazardous substance that has been released into the environment
- **Receptors**: A person, ecosystem or ecological member potentially at risk of experiencing an adverse response following exposure to the source or derivatives of the source
- **Pathway**: A mechanism by which receptors can become exposed to the source or derivatives of the source.

If all three components are present at an exposure scenario, the source-pathway-receptor linkage is considered complete and a receptor is exposed to risk. However, if one of these three is missing there is no risk.

8.2 Sources

The main source areas of PFAS contamination at the Airport are summarised below. It is noted that although AFFF is recognised as the main source of PFAS at the Airport, there is the potential for other sources such as hydraulic fluids and chrome plating activities. The mechanisms for migration identified in Section 8.3 have been written from the viewpoint of AFFF use with the potential for other mechanisms to exist for non-AFFF sources of PFAS.

8.2.1 Primary Sources

The following activities on the Airport are considered to have resulted in PFAS impacts to soil, sediment, surface water and/or groundwater:

- Current and former firefighting training activities at the ARFFS FTG, current ARFFS Fire Station and ARFFS workshop, Former Fire Station, and three historical areas used for firefighting training.
- Response to incidents or fires.
- Maintenance activities metal plating and use of hydraulic fluids containing PFAS.
- Fire suppression systems using foams within the general aviation area such as in hangars [redacted] [redacted] including fire extinguishers.

Contaminants identified previously across the Airport include PFAS (particularly PFOS, PFOA, PFHxA and PFHxS). Some hydrocarbon contamination is also possible in discrete areas, and may be present within the vicinity of the ARFFS FTG. Off-site sources include the WWTP.

8.2.2 Secondary Sources

The following secondary sources were identified on the Airport and are considered to potentially lead to PFAS impacts:

- Surface soil where AFFF was historically discharged to surface

- Unsaturated zone soil beneath potential source zones
- Concrete infrastructure that has been in contact with AFFF
- Sediment and soil along stormwater drains / swales and drainage channels.

8.3 Migration Mechanisms

The mechanisms which may have contributed to the migration of PFAS across and from the Airport include:

- Historical discharge of AFFF containing PFAS to ground surface or leakage from storage infrastructure
- Spilling of AFFF containing PFAS to ground surface during filling and decanting operations
- Sorption of PFAS to soil in areas where AFFFs were historically used
- Localised dispersion of firefighting foams with wind during historical application
- Surface water run-off containing PFAS flowing into surface water and off-site migration within the drainage system
- Leaching of PFAS from soil and infiltration to groundwater in areas where AFFFs were historically used
- Lateral and vertical migration of PFAS in groundwater under the influence of groundwater flow and PFAS dispersion
- Sorption of PFAS to soil below the groundwater table during migration with groundwater. Sorption to soil slows down the migration of PFAS but sorbed PFAS may continue to diffuse back into groundwater and act as a secondary source, if conditions are suitable
- Excavation of soil containing PFAS and relocation
- Leaching of PFAS from concrete structures and infiltration to groundwater
- Transport of sediment along stormwater drains / swales and drainage channels to the Barron River.

8.4 Exposure Pathways:

The following potential exposure pathways have been identified:

- Incidentally ingesting PFAS impacted soil following direct contact
- Direct contact with PFAS impacted surface water and sediment during recreational activities in the Barron River /Trinity Bay
- Consumption of aquatic biota sourced from PFAS impacted surface water
- Ecological receptors in direct contact with PFAS impacted soil, sediment and surface water.

8.5 Receptors

The following potential receptors have been identified:

- Personnel who work at the Airport, including but not limited to ARFFS personnel
- Recreational users of the surface water (Barron River and Trinity Bay)
- Intrusive (i.e. involved in soil excavation) maintenance workers who may conduct infrequent maintenance activities at the Airport
- Human consumers of potentially impacted aquatic biota in the Barron River and Trinity Bay
- The terrestrial ecosystem (flora and fauna)

- The aquatic ecosystem of the Barron River and Trinity Bay.

8.6 Assessment of Exposure Pathways

An assessment of the exposure pathways for the Airport is presented in **Table 26**.

Table 26 Cairns Airport CSM - PFAS

Primary source area	Source media	Transport mechanisms	Exposure pathways	Exposed population characterisation / receptor	Linkages
Fire Training Ground and ARFFS Fire Station identified soil source and elevated concentrations in down gradient groundwater. PFAS has been released to the environment from these facilities through the storage and use of AFFF. PFAS can seep into soil and / or infrastructure from where it can be eroded as sediment or leached by rainwater or flood water and migrate to groundwater or dissolved in surface water runoff and potentially transported to affect other media.	PFAS in shallow soil (<1.0 m)	Water erosion Excavation and re-location of soil during construction activities	Human health: Incidental ingestion of soil on-Site	Personnel who work at the site	Incomplete Soil PFAS concentrations do not exceed human health guidelines (2008 – 2019 data).
			Human health: Dermal contact with soil on-Site	Personnel who work at the site	Incomplete Soil PFAS concentrations do not exceed adopted human health guidelines.
			Ecological	On-Site ecosystem	Potentially complete Soil PFAS concentrations reported during this investigation do not exceed adopted ecological guidelines. However historical soil concentrations do exceed the interim soil ecological guideline for indirect exposure.
	PFAS in groundwater	Groundwater transport in the aquifer followed by extraction and use for recreational and domestic uses and irrigation	Human health: Dermal contact or incidental ingestion of groundwater	Personnel who work at the site	Incomplete Although groundwater concentrations above health guidelines for drinking water and recreational water, however water on-site is not used for drinking water or recreational purposes.
				Residential users of abstracted water	Incomplete There are no water supply bores down-gradient of the area of groundwater contamination.

Primary source area	Source media	Transport mechanisms	Exposure pathways	Exposed population characterisation / receptor	Linkages
Fire Training Ground and ARFFS Fire Station identified soil source and elevated concentrations in down gradient groundwater. PFAS has been released to the environment from these facilities through the storage and use of AFFF. PFAS can seep into soil and / or infrastructure from where it can be eroded as sediment or leached by rainwater or flood water and migrate to groundwater or dissolved in surface water runoff and potentially transported to affect other media.		Groundwater discharging to Barron River and Trinity Bay	Ecological off-site	Aquatic ecosystem	Potentially complete, however considered unlikely as surface water PFAS concentrations in Barron River do not exceed the adopted screening level (Batley et al 2018). It is noted that there are insufficient data to assess seasonal effects.
			Human health: Incidental ingestion and dermal contact of surface water off-site	Recreational	Incomplete Surface water PFAS concentrations in Barron River do not exceed human health guidelines.
	PFAS in surface water	Surface water transport, discharging to Barron River and Trinity Bay	Human health: Incidental ingestion and dermal contact of surface water on-site.	Personnel who work at the site	Although potentially complete, unlikely due to occupational health and safety requirements at the airport.
			Human health: Incidental ingestion and dermal contact of surface water off-site	Recreational	Incomplete Surface water PFAS concentrations in Barron River do not exceed human health guidelines.

Primary source area	Source media	Transport mechanisms	Exposure pathways	Exposed population characterisation / receptor	Linkages
Fire Training Ground and ARFFS Fire Station identified soil source and elevated concentrations in down gradient groundwater. PFAS has been released to the environment from these facilities through the storage and use of AFFF. PFAS can seep into soil and / or infrastructure from where it can be eroded as sediment or leached by rainwater or flood water and migrate to groundwater or dissolved in surface water runoff and potentially transported to affect other media.	PFAS in surface water	Surface water transport, discharging to Barron River and Trinity Bay	Ecological on-site	Aquatic ecosystem	Potentially complete for the drainage channel due to the marginal exceedance of the adopted screening level (Batley et al 2018). Not considered to be complete for concrete swales as there are no ecosystems associated with these drainage features.
			Ecological off-site	Aquatic ecosystem	Potentially complete, however considered unlikely as surface water PFAS concentrations in Barron River do not exceed the adopted screening level (Batley et al 2018). It is noted that there are insufficient data to assess seasonal effects.
	PFAS in sediment	Dispersion via surface water or via drain maintenance activities.	Human health: Incidental ingestion and dermal contact of sediment on-site.	Personnel who work at the site	Although potentially complete, unlikely due to occupational health and safety requirements at the airport.
			Human health: Incidental ingestion and dermal contact of sediment off-Site	Recreational	Incomplete. Off-site sediment PFAS concentrations in the Barron River are at trace concentrations and not considered to pose unacceptable risk to human health.

Primary source area	Source media	Transport mechanisms	Exposure pathways	Exposed population characterisation / receptor	Linkages
Fire Training Ground and ARFFS Fire Station identified soil source and elevated concentrations in down gradient groundwater. PFAS has been released to the environment from these facilities through the storage and use of AFFF. PFAS can seep into soil and / or infrastructure from where it can be eroded as sediment or leached by rainwater or flood water and migrate to groundwater or dissolved in surface water runoff and potentially transported to affect other media.	PFAS in sediment	Dispersion via surface water or via drain maintenance activities.	Ecological on-Site	Aquatic ecosystems	Incomplete Not considered to be complete for concrete stormwater drains as there are no ecosystems associated with these drainage features.
			Ecological off-Site	Aquatic ecosystems	Potentially incomplete. Off-site sediment PFAS concentrations in the Barron River are at trace concentrations and not considered to pose unacceptable risk to ecological health.
	Terrestrial biota	Harvesting	Irrigation of impacted groundwater or use of water for animals followed by ingestion of terrestrial organisms (including fruit and vegetables, chicken eggs)	Residential	Incomplete Although groundwater PFAS concentrations are above health guideline values on-site, off-site registered bores are up-gradient of the site and therefore, the bores are unlikely to be impacted from contamination sourced from the Airport.
		Uptake and bioaccumulation in terrestrial biota	Ecological: ingestion of biota by higher order ecological receptors	On-Site ecosystem	Potentially complete Historical soil concentrations do exceed the interim soil ecological guideline for indirect exposure.
	Aquatic biota	Harvesting	Human health: Ingestion of aquatic organisms (including fish and yabbies, shrimps and mussels)	Residential, recreational	Incomplete PFAS concentrations in biota do not exceed FSANZ guidelines for human health for the consumption of seafood.

Primary source area	Source media	Transport mechanisms	Exposure pathways	Exposed population characterisation / receptor	Linkages
		Uptake and bioaccumulation in aquatic biota	Ecological: ingestion of biota by higher order ecological receptors	Aquatic ecosystems	Incomplete PFAS concentrations in biota do not exceed NEMP guidelines for ecological direct exposure for wildlife diets.

9.0 Conclusions

The key findings of the Investigation are presented below.

On-Site Investigation

- Groundwater elevations and inferred flow directions in June 2019 were similar to the previous gauging event in May 2017. Groundwater flow is generally from west to east with local flow to the northeast towards the Barron River in the northern portion of the Airport.
- PFAS concentrations in near surface soil at three soil bores drilled in May 2019 did not exceed guideline values for health or ecological receptors. The bores are located at distance from the potential source areas identified at the Airport.
- Elevated PFAS concentrations in groundwater (i.e. exceeding national drinking water and recreational water quality guideline levels) were detected in monitoring wells located close to three of the potential PFAS source areas clustered in the western portion of the Airport; includes the ARFFS Fire Station (GW01 had 20.1 µg/L sum of PFHxS and PFOS), the fire training ground (FTG) (up to 46.8 µg/L sum of PFHxS and PFOS in CA03) and the ARFFS workshop / former ARFFS Fire Station (GW01 had 122 µg/L sum of PFHxS and PFOS. The PFOS concentrations detected in this Investigation were consistent with two previous sampling events undertaken since 2014, indicating that the plume is relatively stable and mature.
- The lateral migration of PFAS in groundwater on-site appears limited as PFAS concentrations in groundwater at monitoring wells along the eastern and northern Airport boundaries, hydraulically down-gradient of the potential source areas were relatively lower (maximum of 0.25 µg/L sum of PFHxS and PFOS in GW08A). The limited migration may reflect the clay soil conditions beneath the Airport which is likely to have low hydraulic conductivity or the tidal influence of the nearby marine water bodies. This suggests PFAS soil and groundwater impacts are likely to be localised close to the potential source areas. It is noted that the highest PFAS concentrations are detected in monitoring wells that are screened across both the fill and underlying natural clay soil, which may suggest water sampled at these locations may be in contact with PFAS contamination in the fill and not necessarily representative of groundwater in these areas.
- Nine co-located surface water and sediment samples were collected from drainage channels and concrete stormwater drains across the Airport. Elevated PFAS concentrations in surface water and sediment (i.e. exceeding recreational water quality guideline levels) were detected along the concrete stormwater drain that runs from the ARFFS Fire Station in the central western portion of the Airport to the north, discharging into a drainage channel that runs along the western boundary and flows into the Barron River.

  The higher surface water PFAS concentrations were detected in the sampling location closest to the ARFFS Fire Station (5.5 µg/L sum of PFHxS and PFOS at SW05) with decreasing PFAS concentrations with increased distance from the ARFFS Fire Station. It was noted that the water sampled in this stormwater drain was stagnant as there was no flow in the stormwater drain. The source of PFAS in the surface water in the stormwater drain could potentially be from leaching of sediment in the stormwater drain. A surface water sample from the downstream drainage channel had much lower PFAS concentrations (SW08A 0.06 µg/L sum of PFHxS and PFOS). The drainage channel, which is connected to the Barron River, is affected by tidal flows (tidal gates were open at the time of sampling) so PFAS discharged into the channel will be attenuated by tidal dilution. This is supported by the observed PFAS concentrations in water samples collected from the drainage channel and the Barron River.
- Surface water and sediment samples collected from a separate concrete stormwater drain in the northern portion of the Airport had relatively minor PFAS impacts (up to 0.3 µg/L sum of PFHxS and PFOS in SW04) which may be associated with a nearby area used for historical fire training activities. Trace concentrations of PFAS were detected in surface water and sediment samples in the southern and eastern portions of the Airport.

- Some hydrocarbons were detected in surface water and sediment samples from the stormwater drains and drainage channels and these may be due to the presence of natural hydrocarbons from organic matter, rather than indicating a manmade source such as fuel spillage. Some metal concentrations (cadmium, copper, lead, nickel and zinc) were detected in surface water samples in excess of the guideline screening levels for the protection of marine ecosystems. A sample of sediment at one location from the stormwater drain near the ARFFS Fire Station marginally exceeded the upper guideline values for toxicants for zinc and nickel. As there were no exceedances of metal toxicants in surface water samples from Barron River, it is considered unlikely that there are unacceptable risks to the Barron River from heavy metals.

Off-Site Investigation

- Biota, surface water and sediment samples were collected from four sampling locations along the Barron River adjacent to the Airport's northern boundary. The PFAS concentrations detected in these samples did not exceed health guideline levels indicating there is no adverse risk to human health from the consumption of seafood from the river (based on the analytical results of 16 fish and crustacean samples) or from the recreational use of the river, at the locations sampled. This conclusion is based on a limited number of biota samples, however, is supported by the consistent non-exceedance of guideline levels for surface water.
- Assessment of the risk to aquatic ecosystems from the PFAS concentrations in surface water concluded that the concentrations were of low significance and the risk is considered likely to be acceptable and further assessment is not warranted.
- Hydrocarbons were detected in surface water and sediment samples and these may be due to the presence of natural hydrocarbons as a result of the estuarine setting, rather than indicating a manmade source such as fuel spillage. Surface water samples were also analysed for faecal coliform and assessment of the results indicated exceedance of the guideline level for the recreational use of the water for primary contact activities such as swimming. There was no exceedance of the secondary contact screening level for recreational activities such as boating.

Based on these key findings, an updated conceptual site model has been developed and despite residual PFAS impact being identified on and migrating from the Airport, no complete and / or significant exposure pathways connecting on-site sources to off-site receptors have been identified.

The main data gaps identified for the Airport include the following:

- While likely localised, the extent of PFAS in soil in the unsaturated zone in source areas and the localised lateral extent of PFAS in groundwater close to the three main source areas; ARFFS Fire Station, FTG and ARFFS workshop / former Fire Station. In particular, the extent of PFAS in groundwater hydraulically up-gradient of GW01 and concentrations along the western Airport boundary.
- Trends in PFAS in groundwater and surface water including the effects of seasonal changes.
- Nature of hydrocarbons detected in surface water and sediment on-site (e.g. natural or petroleum-related).

10.0 References

AECOM (2018), Sampling, Analysis and Quality Plan, Cairns Airport – PFAS Targeted Sampling Program, March 2019.

ASTM D7968-14 Standard Test Method for Determination of Perfluorinated Compounds in Soil by Liquid Chromatography Tandem Mass spectrometry (LC/MS/MS). American Society for Testing and Materials (ASTM).

ASTM D7979-15 Standard Test Method for Determination of Perfluorinated Compounds in Water, Sludge, Influent and Wastewater by Liquid Chromatography Tandem Mass spectrometry (LC/MS/MS). American Society for Testing and Materials (ASTM).

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018) at https://www.waterquality.gov.au/anz-guidelines/guideline-values/default

Australian and New Zealand Environment Conservation Council (ANZECC) (2000), Water Quality Guidelines.

Australian Government, National Water Commission 2012, Minimum Construction Requirements for Water Bores in Australia, Edition 3, February 2012.

Australian Government (2018) Revised method for deriving Australian and New Zealand water quality guideline values for toxicants, October 2018.

Australian Government (2019) National Health and Medical Research Council (2019), Guidance on Per and Polyfluoroalkyl substances in Recreational Water.

Department of Agriculture and Fisheries (2019), *Fisheries Act 1994*

Department of Environment (1998), Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland

Department of Environment and Heritage Protection (2014), Environmental Protection (Water) Policy 2009 Barron River Basin Environmental Values and Water Quality Objectives, Basin No. 110 and adjacent coastal waters, November 2014

Department of Environment and Science (2019), *Environmental Protection Act 1994*

Department of Transport and Regional Services (1997), Airports (Environment Protection) Regulations, Schedule 3.

Fish base (2019) (http://www.fishbase.org/search.php)

Food Standards Australia and New Zealand (FSANZ), on behalf of the Australian Department of Health (2017), Health Based Guidance Values for PFAS.

GHD (2008), Report for ARFFS National Testing Project, Preliminary Site Contamination Assessment – Cairns ARFFS Drill Ground, Cairns Airport (ref 41/20219/00/378625).

GHD (2014), AFFF Soil and Groundwater Assessment, Cairns ARFFSS Drill Ground (ref 42/18356)

GHD, 2015, Airservices Australia, Managing PFC Contamination at Airports, Interim Contamination Management Strategy and Decision Framework (31\32279\239419).

GHD (2017a), Airservices Australia, Cairns Airport HFTG Assessment Geotechnical Investigation Report (ref 4220326).

GHD (2017b), PFAS Investigation – Derivation of PFAS Soil and Water Criteria for Airservices Australia.

GHD (2018a), Airservices Australia, Draft Cairns Airport Preliminary Site Investigation (ref 31/34249).

GHD (2018b), Airservices Australia, Draft Cairns Airport Preliminary Sampling Report (ref 31/34249).

Golder Associates (2016), Cairns Airport Traffic Control Tower Refurbishment Works – Contamination and Acid Sulphate Soil Assessment, Cairns Airport.

Government of Western Australia Department of Environmental Regulation, 2017. Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances, Version 2.1 (20 January 2017).

Grant, E.M (2002), Grants Guide to Fishes, E.M Grants Pty Limited, Scarborough, Queensland.

Heads of Environmental Protection Agencies Australian and New Zealand, 2018, PFAS National Environmental Plan (NEMP), January 2018.

Kuiter, R.H (2000), Coastal Fishes of South-Eastern Australia, Garry Allen Pty Ltd, Smithfield, New South Wales.

Minnesota Department of Health (2008), Health Risk Limits for Perfluorochemicals Report to the Minnesota Legislature.

Minnesota Department of Health (2009), Human Health-Based Water Guidance.

Minnesota Pollution Control Agency (2009), Risk-Based Guidance for the Soil-Human Health Pathway.

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

National Environmental Protection Council (1999), National Environmental Protection Measure, Guideline on Investigation Levels for Soil and Groundwater, Schedule B1 (Health Based Investigation Levels for Commercial/Industrial Use).

National Environment Protection Council (NEPC), 1999. National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013.

Queensland Government (2019) Guideline for sampling and analysis of seafood suitable for human health risk assessments of PFAS contamination.

SLR Consulting (2013), Airservices Cairns Fire Station Water and Soil Quality Assessment (ref 622.10325).

Standards Australia (AS4482.1-2005) Guide to the sampling and investigation of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds.

Standards Australia (AS 4482.2-1999) Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile Substances.

Standards Australia, 1998a. Water quality – Sampling. Part 11: Guidance on sampling of groundwaters. Australian Standards, AS5667.11, 5 April 1998.

US EPA (1999), Contract Laboratory Program for Organic Data Review, October 1999.

US EPA (2002), Contract Laboratory Program for Inorganic Data Review, July 2002

US EPA (2002), Guidance on Environmental Data Verification and Data Validation, November 2002.

US EPA (2006) Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4 (EPA 240/B-06/001).

USEPA (2009a), Region 4 Memorandum, Soil Screening Levels for Perfluorooctanaoic Acid (PFOA) and Perfluorooctyl Sulfonate (PFOS).

US EPA (2009b) Method 537: Determination of selected perfluorinated alkyl acids in drinking water by solid phase extraction and liquid chromatography/tandem mass spectrometry (LC/MS/MS), version 1.1, September 2009. National Exposure Research Laboratory, Office of Research and Development, US Environmental Protection Agency.

11.0 Limitations

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List of Appendices

Appendix A

Figures

Appendix A Figures

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Coordinate System: GDA 1994 MGA Zone 55

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LEGEND

- ▭ Airport Boundary
- — Roads (State Controlled)
- — Drainage Channels
- — Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

Site Location

Airservices Australia

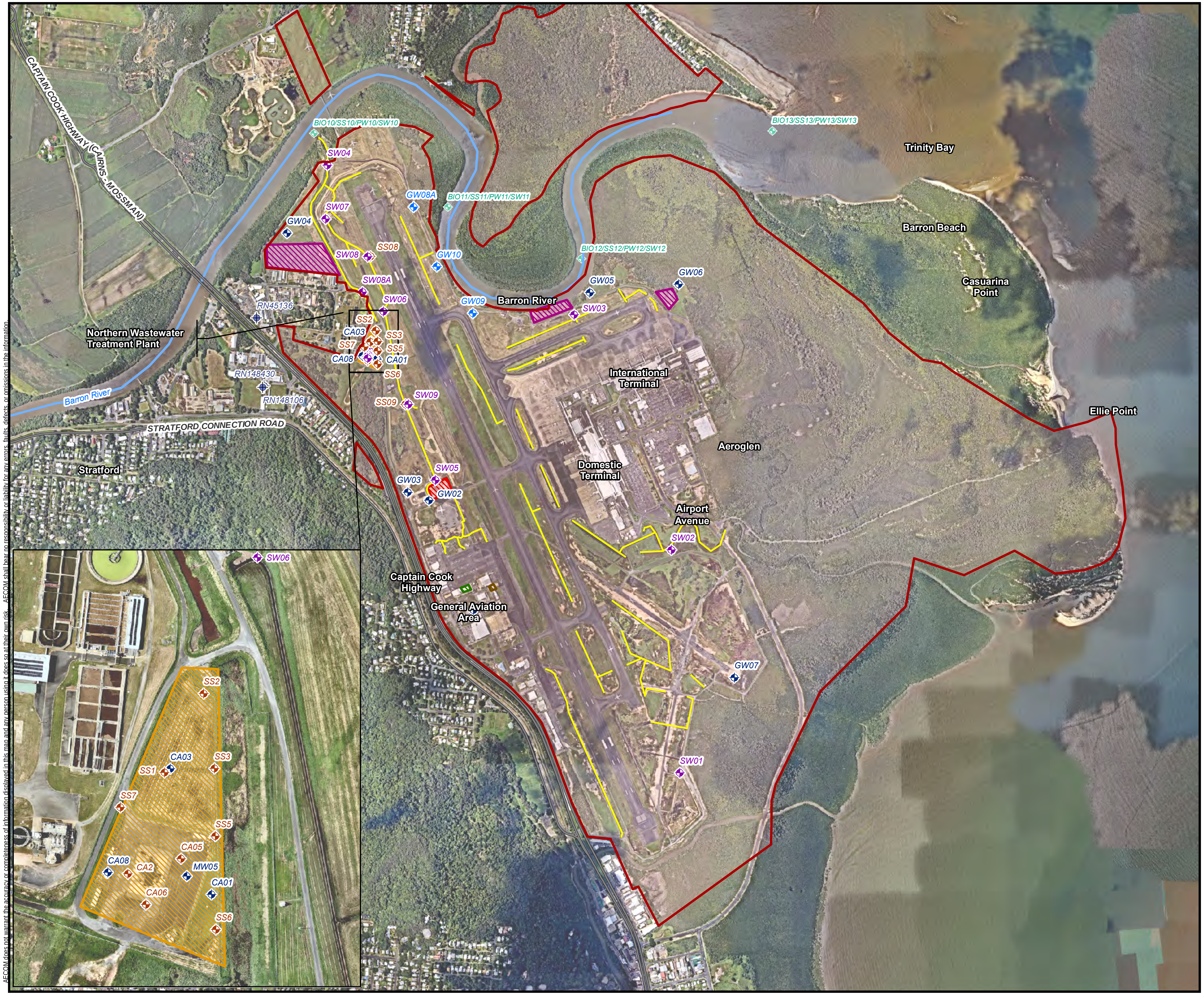
Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure

F1

Map Document: (G:\WTR\SpatialSys\Projects\2019\Cairns_Airport\PPSI_Targeted_Sampling\F1_Site_Location.mxd)



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LEGEND

- Airport Boundary
- Existing Groundwater Monitoring Well
- Surface Water/Sediment Sampling Location
- New Groundwater Monitoring Well
- Historical Soil Bores
- Biota, Surface Water, Porewater and Sediment Location
- Registered Groundwater Bores
- Roads (State Controlled)
- Drainage Channels
- Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

Site Layout and Sampling Locations

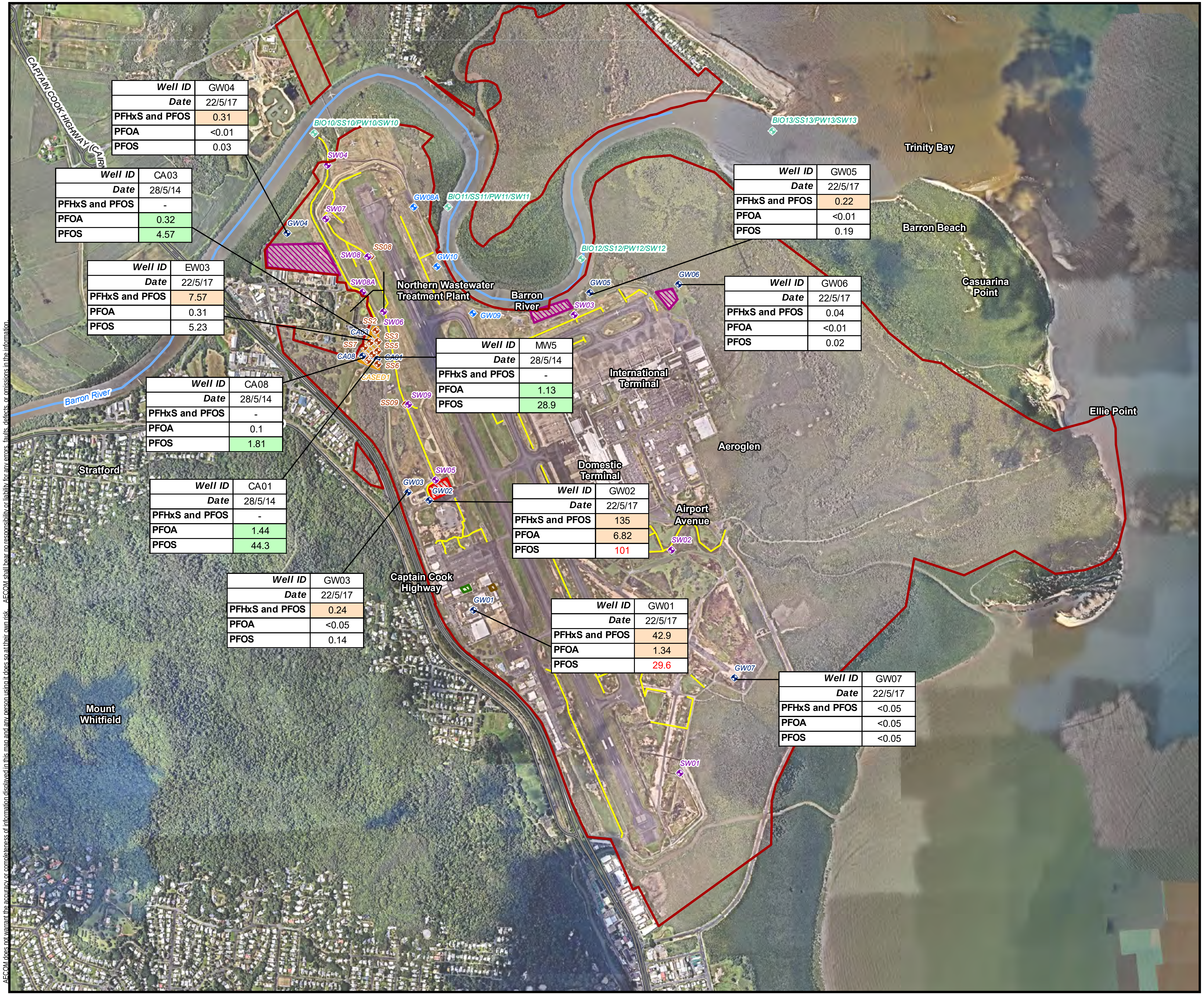
Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure

F2



Well ID	GW04
Date	22/5/17
PFHxS and PFOS	0.31
PFOA	<0.01
PFOS	0.03

Well ID	CA03
Date	28/5/14
PFHxS and PFOS	-
PFOA	0.32
PFOS	4.57

Well ID	EW03
Date	22/5/17
PFHxS and PFOS	7.57
PFOA	0.31
PFOS	5.23

Well ID	CA08
Date	28/5/14
PFHxS and PFOS	-
PFOA	0.1
PFOS	1.81

Well ID	CA01
Date	28/5/14
PFHxS and PFOS	-
PFOA	1.44
PFOS	44.3

Well ID	GW03
Date	22/5/17
PFHxS and PFOS	0.24
PFOA	<0.05
PFOS	0.14

Well ID	MW5
Date	28/5/14
PFHxS and PFOS	-
PFOA	1.13
PFOS	28.9

Well ID	GW02
Date	22/5/17
PFHxS and PFOS	135
PFOA	6.82
PFOS	101

Well ID	GW01
Date	22/5/17
PFHxS and PFOS	42.9
PFOA	1.34
PFOS	29.6

Well ID	GW05
Date	22/5/17
PFHxS and PFOS	0.22
PFOA	<0.01
PFOS	0.19

Well ID	GW06
Date	22/5/17
PFHxS and PFOS	0.04
PFOA	<0.01
PFOS	0.02

Well ID	GW07
Date	22/5/17
PFHxS and PFOS	<0.05
PFOA	<0.05
PFOS	<0.05

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LEGEND

▭	Airport Boundary
◆	Existing Groundwater Monitoring Well
◆	Surface Water/Sediment Sampling Location
◆	New Groundwater Monitoring Well
◆	Historical Soil Bores
◆	Biota, Surface Water, Porewater and Sediment Location
—	Roads (State Controlled)
—	Drainage Channels
—	Watercourses

Airservices ARFFS features at Cairns Airport

▨	ARFFS Fire Station
▨	ARFFS Fire Training Ground
▨	ARFFS Workshop
▨	Former Fire Station
▨	Area used for Historical Fire Training (approximate)

		Airservices EISLs (toxicity effects on aquatic organisms)	FSANZ - PFAS Drinking water quality guideline	MDH 2009: Health Risk Limits for Drinking Water
PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L		0.07	
Perfluorooctanoic acid (PFOA)	µg/L	2900	0.56	0.3
Perfluorooctane sulfonic acid (PFOS)	µg/L	6.66		0.3

All results in µg/L

Historical Groundwater PFAS Analytical Results

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure
F3

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LEGEND

- 🟥 Airport Boundary
- ◆ Existing Groundwater Monitoring Well
- ◆ New Groundwater Monitoring Well
- - - Inferred Groundwater Contours May 2019 (mAHD)
- ➔ Inferred Groundwater Flow Direction May 2019
- ▬ Roads (State Controlled)
- ▬ Drainage Channels
- ▬ Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

Inferred Groundwater Contours May 2019

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure
F4

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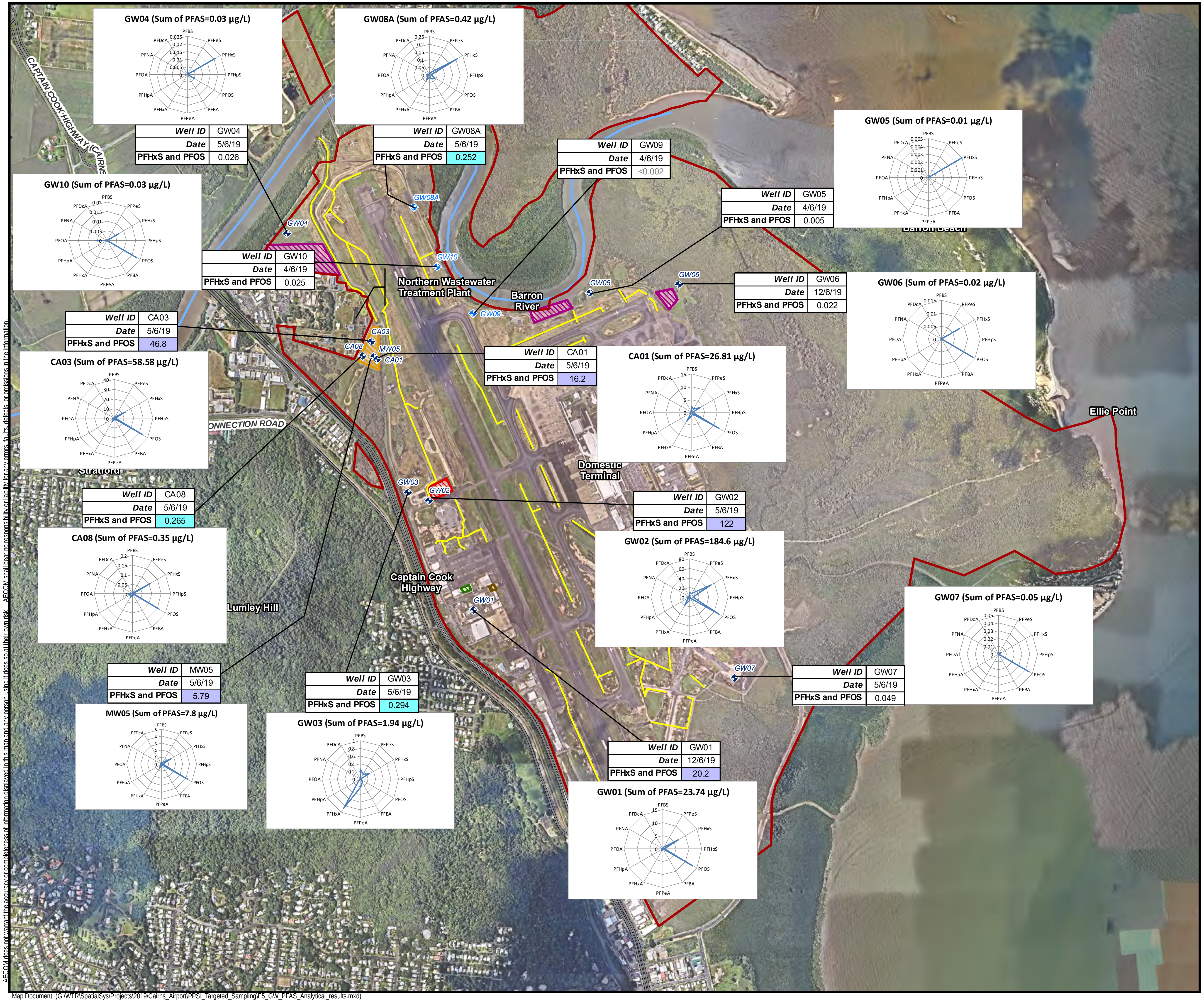

Well ID	GW04
Date	5/6/19
PFHxS and PFOS	0.026

Well ID	GW08A
Date	5/6/19
PFHxS and PFOS	0.252

Well ID	GW09
Date	4/6/19
PFHxS and PFOS	<0.002

Well ID	GW05
Date	4/6/19
PFHxS and PFOS	0.005

Well ID	GW10
Date	4/6/19
PFHxS and PFOS	0.025

Well ID	GW06
Date	12/6/19
PFHxS and PFOS	0.022

Well ID	CA03
Date	5/6/19
PFHxS and PFOS	46.8

Well ID	CA01
Date	5/6/19
PFHxS and PFOS	16.2

Well ID	CA08
Date	5/6/19
PFHxS and PFOS	0.265

Well ID	GW02
Date	5/6/19
PFHxS and PFOS	122

Well ID	GW07
Date	5/6/19
PFHxS and PFOS	0.049

Well ID	MW05
Date	5/6/19
PFHxS and PFOS	5.79

Well ID	GW03
Date	5/6/19
PFHxS and PFOS	0.294

Well ID	GW01
Date	12/6/19
PFHxS and PFOS	20.2

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LEGEND

- ▭ Airport Boundary
- ◆ Existing Groundwater Monitoring Well
- ◆ New Groundwater Monitoring Well
- — Roads (State Controlled)
- — Drainage Channels
- — Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

Human health guideline values for Sum of PFHxS and PFOS	ug/L
NEMP (2018) Human Health Drinking Water	0.07
NEMP (2018) Human Health Recreational Water	0.7

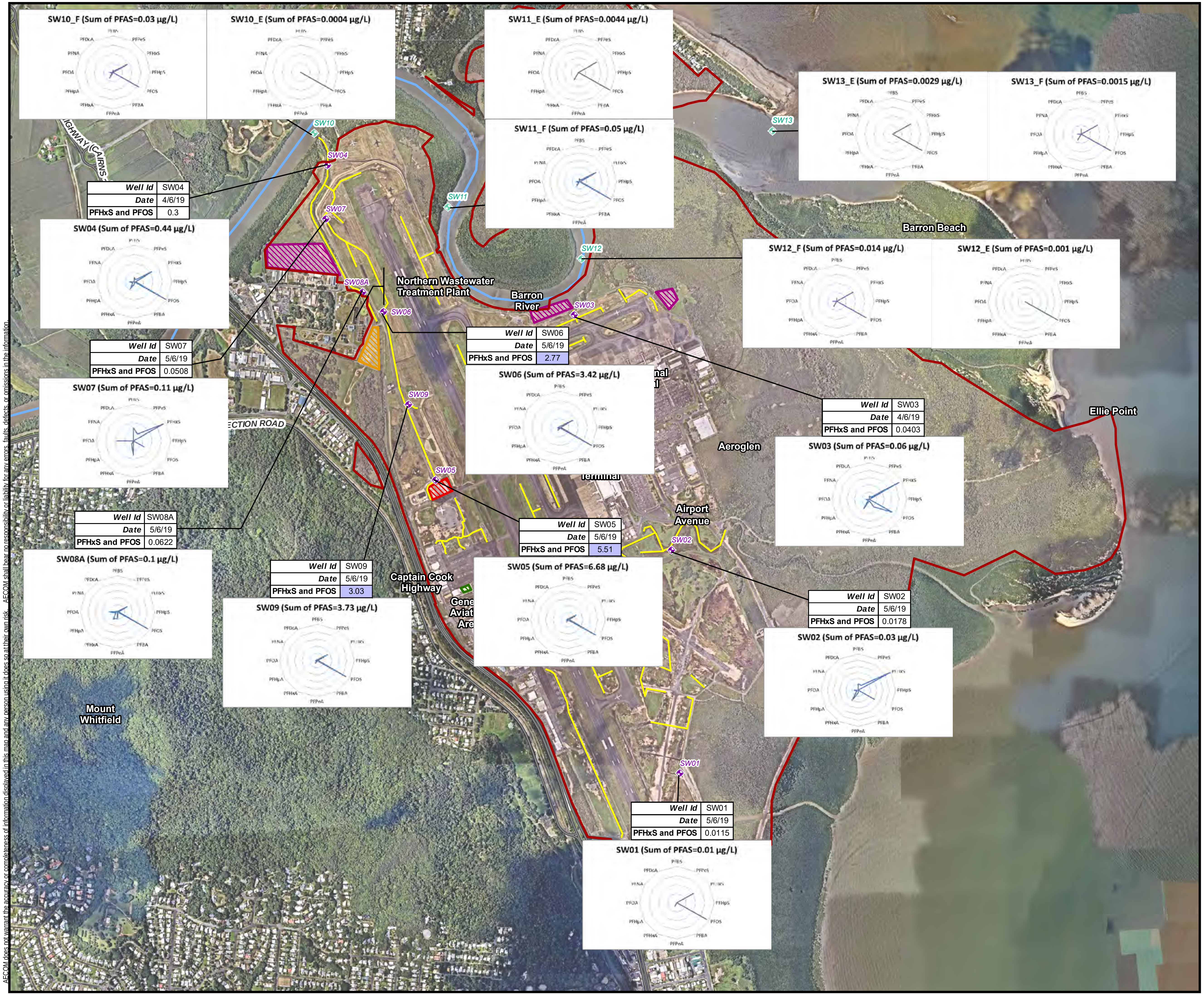
Groundwater PFAS Analytical Results

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure
F5



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LEGEND

- 🟥 Airport Boundary
- ● Surface Water/Sediment Sampling Location
- ● Surface/Porewater/Sediment Location
- ▬ Roads (State Controlled)
- ▬ Drainage Channels
- ▬ Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

EQL	ug/L
NEMP 2018 Human Health Recreational Water	0.7

Surface Water PFHxS and PFOS Analytical Results June 2019

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure
F6

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LEGEND

- ▭ Airport Boundary
- ◆ Surface Water/Sediment Sampling Location
- ◆ Surface/Porewater/Sediment Location
- — Roads (State Controlled)
- — Drainage Channels
- — Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

PFHxS and PFOS in mg/kg

Sediments PFHxS and PFOS Analytical Results June 2019

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure
F7

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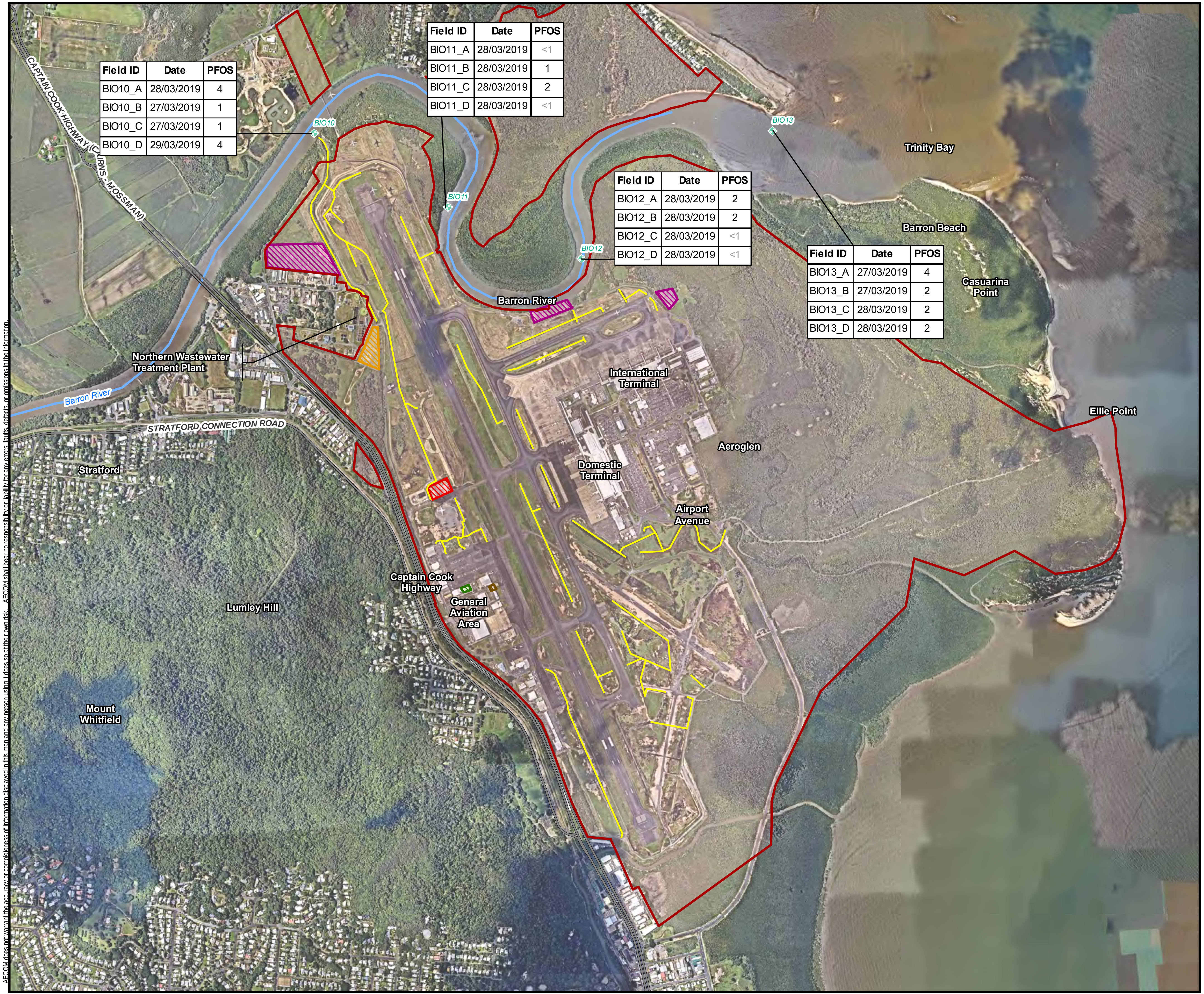

Field ID	Date	PFOS
BIO10_A	28/03/2019	4
BIO10_B	27/03/2019	1
BIO10_C	27/03/2019	1
BIO10_D	29/03/2019	4

Field ID	Date	PFOS
BIO11_A	28/03/2019	<1
BIO11_B	28/03/2019	1
BIO11_C	28/03/2019	2
BIO11_D	28/03/2019	<1

Field ID	Date	PFOS
BIO12_A	28/03/2019	2
BIO12_B	28/03/2019	2
BIO12_C	28/03/2019	<1
BIO12_D	28/03/2019	<1

Field ID	Date	PFOS
BIO13_A	27/03/2019	4
BIO13_B	27/03/2019	2
BIO13_C	28/03/2019	2
BIO13_D	28/03/2019	2

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LEGEND

- ▭ Airport Boundary
- ⌖ Biota Location
- — Roads (State Controlled)
- — Drainage Channels
- — Watercourses

Airservices ARFFS features at Cairns Airport

- ▨ ARFFS Fire Station
- ▨ ARFFS Fire Training Ground
- ▨ ARFFS Workshop
- ▨ Former Fire Station
- ▨ Area used for Historical Fire Training (approximate)

EQL	µg/kg
FSANZ 2017 2 years + Finfish (all) (Adult)	11
FSANZ 2017 2-6 years Finfish (all) (Child)	5.2

Biota PFAS Analytical Results March 2019

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure
F8

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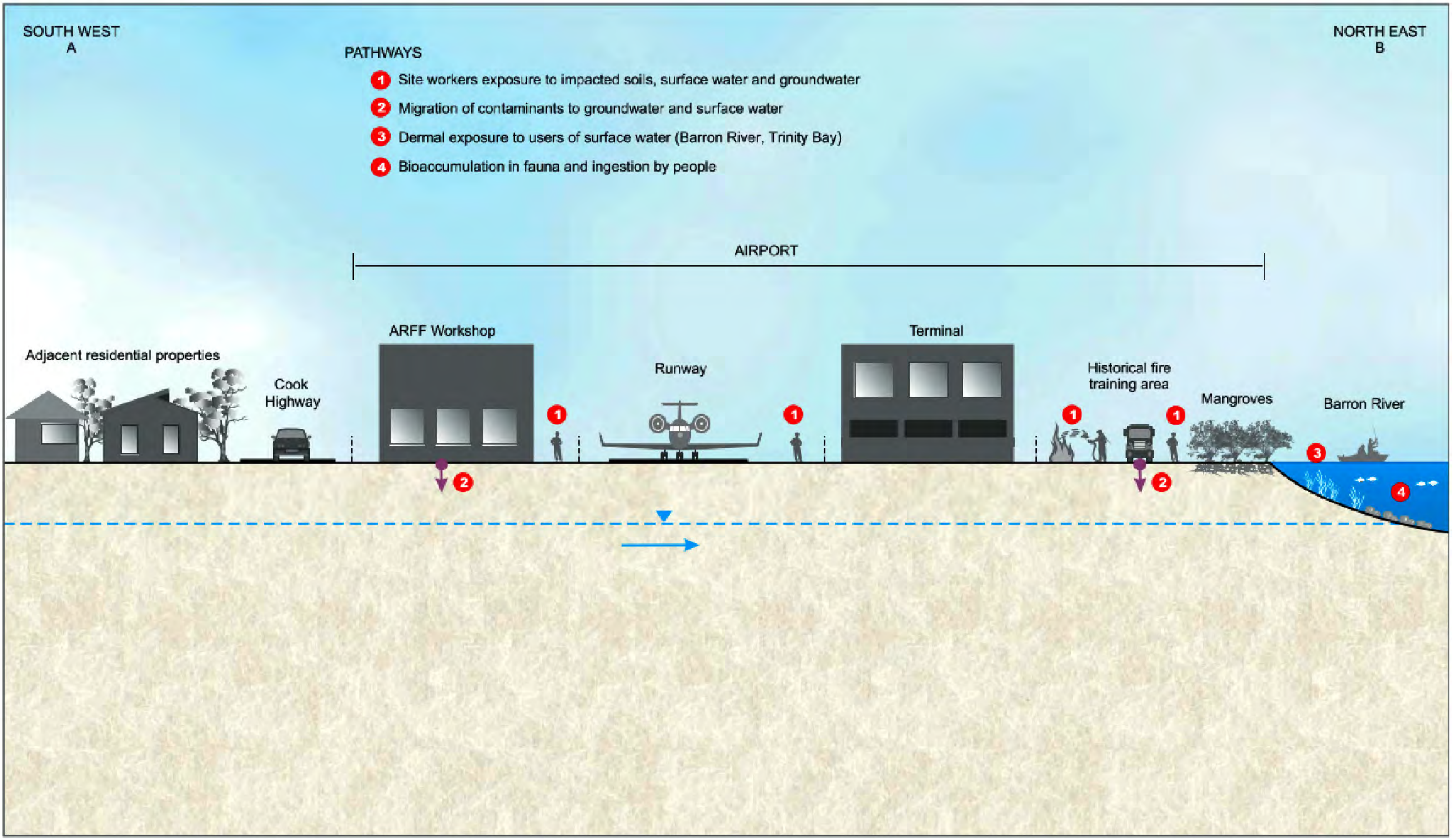

LEGEND

▭	Sandy fill/sand
→	Anticipated groundwater flow direction
●	Possible sources of PFAS
←	Migration of contaminants
▼	Groundwater table

NOTE

Conceptual diagram only - not to scale

CSM figure sourced from GHD (2018b)

Conceptual Site Model
South West - North East

Airservices Australia

Post Preliminary Site Investigation
Targeted Sampling

Cairns Airport, Queensland

Figure
F9a

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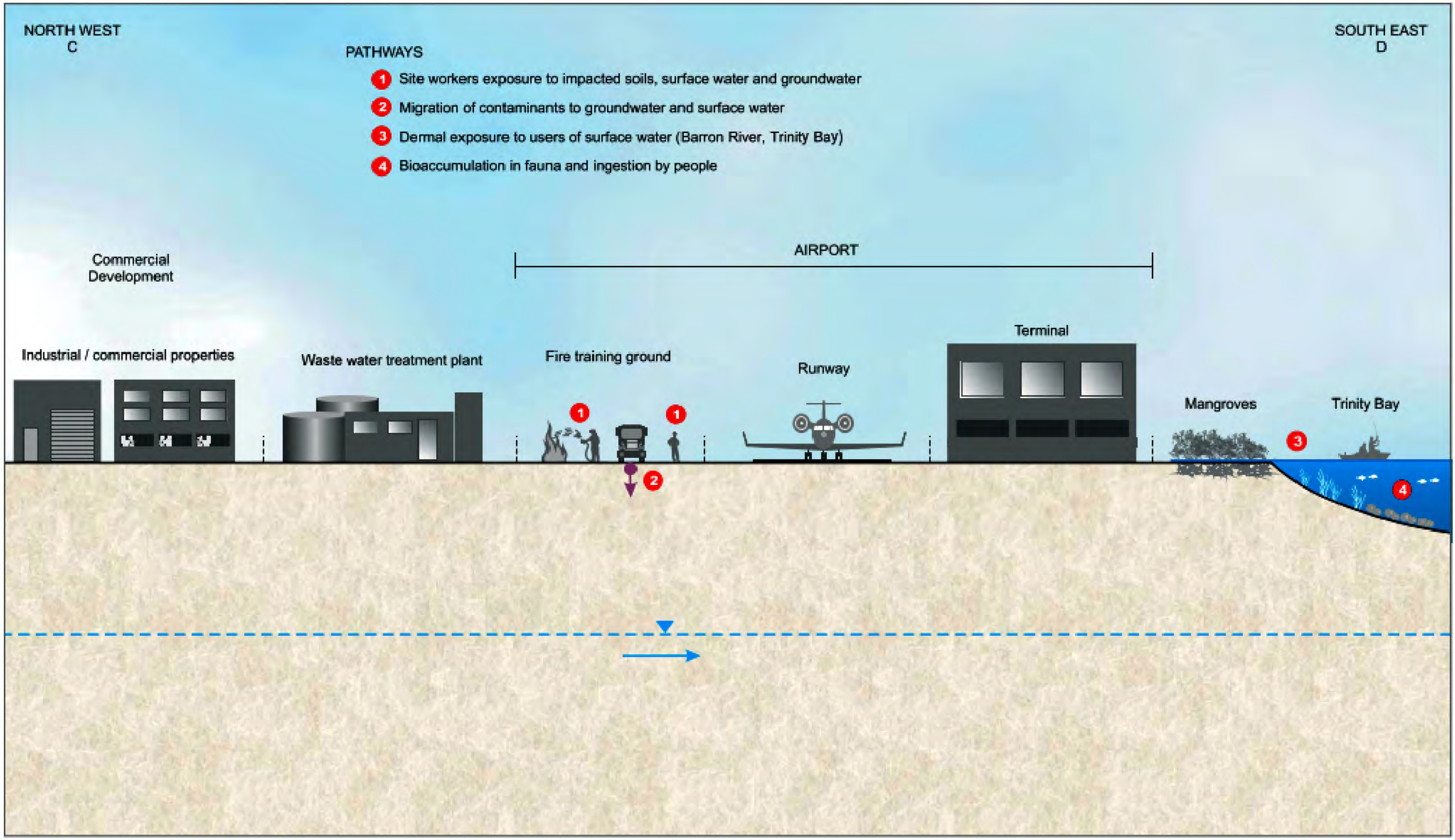


PATHWAYS

1. Site workers exposure to impacted soils, surface water and groundwater
2. Migration of contaminants to groundwater and surface water
3. Dermal exposure to users of surface water (Barron River, Trinity Bay)
4. Bioaccumulation in fauna and ingestion by people

LEGEND

- ▭ Sandy fill/sand
- → Anticipated groundwater flow direction
- ● Possible sources of PFAS
- ← Migration of contaminants
- ▼ Groundwater table

NOTE

Conceptual diagram only - not to scale

CSM figure sourced from GHD (2018b)

Conceptual Site Model
North West - South East

Airservices Australia

Post Preliminary Site Investigation Targeted Sampling

Cairns Airport, Queensland

Figure

F9b

Appendix B

Tables

Appendix B Tables

Location ID Area	Date of Installation	Easting	Northing	Top of Casing Elevation (mAHD)	Cover	TOC Elevation (m AHD)	Drilled Depth (m)	Top of screen (mbgs)	Water Strike (mbgs)	Lithology of screened section
CA01	24/06/2008	366161	8134216	NA	Standpipe	NA	2.0	NA	1.8	Gravel to silty sand
CA03	24/06/2008	366184	8134142	NA	Standpipe	NA	5.5	1.0	1.8	Sandy gravel to clayey sand
CA08	20/05/2014	NA	NA	NA	Standpipe	NA	4.0	1.0	1.1	Sandy clay to sand
MW05	NA	NA	NA	NA	Gatic	NA	NA	NA	NA	NA
GW01	6/05/2017	366646	8132989	2.12	Gatic	2.12	4.0	1.0	0.8	Sandy silt to silty clay
GW02	5/05/2017	366452	8133495	1.9	Gatic	1.9	4.5	1.5	1.3	Gravelly sand to sandy clay
GW03	5/05/2017	366331	8133538	1.19	Gatic	1.19	4.0	1.0	0.6	Gravelly silt to silty clay
GW04	5/05/2017	365788	8134210	2.066	Gatic	2.066	4.0	1.0	1.0	Sandy silt to silty clay
GW05	5/05/2017	367194	8134455	2.033	Gatic	2.033	3.5	0.5	1.0	Silt to sand
GW06	5/05/2017	367610	8134466	2.384	Gatic	2.384	4.0	1.0	1.6	Sand to clay to sand
GW07	6/05/2017	367838	8132688	0.912	Gatic	0.912	4.0	1.0	1.8	Gravelly silt to silty clay
GW08A	28/05/2019	366358	8134860	2.34	Gatic	2.34	3.0	1.1	1.5	Sandy clay
GW09	28/05/2019	366662	8134357	2.31	Gatic	2.31	3.0	1.0	2.2	Sand
GW10	28/05/2019	366474	8134578	2.01	Gatic	2.01	3.0	1.0	2.0	Sand

NA Not Available

Well ID	Easting	Northing	Top of Casing Elevation (mAHD)	Gauging Date	Total Depth (mbtoc)	Depth to Water (mbtoc)	Corrected Groundwater Elevation (mAHD)
CA01	NA	NA	NA	5/06/2019	4.5	1.819	NA
CA03	NA	NA	NA	5/06/2019	6	0.897	NA
CA08	NA	NA	NA	5/06/2019	4.2	2.293	NA
MW05	NA	NA	NA	5/06/2019	4.7	1.502	NA
GW01	366646	8132989	2.12	12/06/2019	4.083	0.972	1.148
GW02	366452	8133495	1.9	5/06/2019	3.8	1.307	0.593
GW03	366331	8133538	1.19	5/06/2019	3.8	0.564	0.626
GW04	365788	8134210	2.066	5/06/2019	3.85	1.191	0.875
GW05	367194	8134455	2.033	4/06/2019	3.2	1.674	0.359
GW06	367610	8134466	2.384	12/06/2019	3.96	1.672	0.712
GW07	367838	8132688	0.912	5/06/2019	4	1.163	-0.251
GW08A	366358	8134860	2.34	5/06/2019	3	1.003	1.34
GW09	366662	8134357	2.31	4/06/2019	3	2.364	-0.059
GW10	366474	8134578	2.01	4/06/2019	3	1.789	0.22

NA Not Available

Well ID	Date	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)*
CA01	5/06/2019	5.60	26.8	94.9	61.7	1.85	343.5
CA03	5/06/2019	6.09	27.3	1333	866.5	0.41	240.7
CA08	5/06/2019	5.77	26.6	109.5	71.2	0.13	305.9
MW05	5/06/2019	5.66	27.7	107.5	69.9	0.23	366.1
GW01	12/06/2019	6.42	26.8	1768	1149.2	0.67	-65.2
GW02	5/06/2019	6.40	26.2	24128	15683.2	0.18	119.1
GW03	5/06/2019	6.58	27.3	62341	40521.7	0.07	136
GW04	5/06/2019	6.34	25.7	418.8	272.2	0.14	151.4
GW05	4/06/2019	5.99	26.2	1958	1272.7	0.36	263.6
GW06	12/06/2019	6.16	26.1	8735	5677.8	0.04	8.1
GW07	5/06/2019	6.74	25.3	57793	37565.5	0.08	65.2
GW08A	5/06/2019	6.45	25.4	7479	4861.4	0.25	186.1
GW09	4/06/2019	5.58	25.9	92	59.8	1.26	409.6
GW10	4/06/2019	5.95	26	223.6	145.3	1.71	320.8

Table T4 Surface Water Quality Parameter Results

Well ID	Location	Date	Depth	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Dissolved Oxygen (mg/L)	Field Oxidation Reduction Potential (mV)	Oxidation Reduction Potential (mV)*	Turbidity
SW01	On-site	4-May-19	Surface	7.72	19.2	43396	28207	5.65	92.3	297.3	-
SW02	On-site	4-May-19	Surface	7.69	19.7	26694	17351	6.65	88.8	293.8	-
SW03	On-site	4-May-19	Surface	7.12	24.3	26671	17336	3.89	-24.2	180.8	-
SW04	On-site	4-May-19	Surface	7.34	23.2	32896	21382	4.06	56.9	261.9	-
SW05	On-site	4-May-19	Surface	8.31	20.6	2625	1706	8.38	-60.7	144.3	-
SW06	On-site	4-May-19	Surface	8.51	21.1	2534	1647	10.51	111.3	316.3	-
SW07	On-site	4-May-19	Surface	8.03	24.3	37455	24346	7.87	158.2	363.2	-
SW08	On-site	4-May-19	Surface	Dry	Dry	Dry	Dry	Dry	Dry	Dry	-
SW08A	On-site	4-May-19	Surface	7.03	26	1464	952	5.58	109.8	314.8	-
SW09	On-site	4-May-19	Surface	8.06	19.6	2478	1611	7.78	93.5	298.5	-
SW10	Barron River- flood	28-Mar-19	Surface	6.9	29.8	409	266	8.7	-	-	20.3
	Barron River- flood	28-Mar-19	1 mbs	6.8	27.3	601	391	8.6	-	-	20.1
	Barron River- flood	28-Mar-19	2 mbs	6.8	27	970	631	9.7	-	-	22.3
	Barron River- flood	28-Mar-19	3mbs	7.1	28.7	34000	22100	5.4	-	-	11.2
	Barron River- ebb	28-Mar-19	Surface	7	26.2	150	98	7.7	-	-	35.1
	Barron River- ebb	28-Mar-19	1 mbs	6.9	26.3	155	101	7.7	-	-	40
	Barron River- ebb	28-Mar-19	2 mbs	6.9	26.3	165	107	7.8	-	-	38.2
SW11	Barron River- flood	27-Mar-19	Surface	7	28.3	483	314	8.3	-	-	27.4
	Barron River- flood	27-Mar-19	1 mbs	6.9	26.5	1100	715	9	-	-	28.7
	Barron River- flood	27-Mar-19	2 mbs	7.8	29.1	30600	19890	9	-	-	22.8
	Barron River- ebb	27-Mar-19	Surface	6.8	26.7	2600	1690	7	-	-	24.9
	Barron River- ebb	27-Mar-19	1 mbs	6.7	27	4000	2600	6.8	-	-	22
	Barron River- ebb	27-Mar-19	2 mbs	6.7	26.7	5000	3250	7.1	-	-	34.3
SW12	Barron River- flood	27-Mar-19	Surface	7	28.4	516	335	9	-	-	23.4
	Barron River- flood	27-Mar-19	1 mbs	6.8	26.3	2140	1391	10.1	-	-	24.1
	Barron River- flood	27-Mar-19	2 mbs	7.2	28.5	27900	18135	7	-	-	12.3
	Barron River- flood	27-Mar-19	3mbs	7.6	30.2	44.8	29	5.4	-	-	12.8
	Barron River- ebb	27-Mar-19	Surface	6.7	27	4400	2860	5.3	-	-	29.6
	Barron River- ebb	27-Mar-19	1 mbs	6.7	27.2	5800	3770	5.4	-	-	39.9
	Barron River- ebb	27-Mar-19	2 mbs	6.7	27.3	7300	4745	6.3	-	-	37.1
	Barron River- ebb	27-Mar-19	3mbs	6.8	28	10600	6890	6.1	-	-	30.5
SW13	Barron River- flood	27-Mar-19	Surface	6.7	28.3	1680	1092	8.2	-	-	22.5
	Barron River- flood	27-Mar-19	1 mbs	7.2	28	15000	9750	8.3	-	-	16.8
	Barron River- flood	27-Mar-19	2 mbs	7.9	31	44300	28795	8.4	-	-	12.8
	Barron River- ebb	27-Mar-19	Surface	7.5	27.6	8000	5200	6.4	-	-	15.2
	Barron River- ebb	27-Mar-19	1 mbs	7.5	30.3	30000	19500	5.3	-	-	15
	Barron River- ebb	27-Mar-19	2 mbs	7.5	30.2	31200	20280	5.1	-	-	14.1

Table T5 Soil Analytical Results: PFAS

				PFHxS + PFOS	PFOS	PFHxS	PFHxA	PFOA	PFBA	PFBS	PFPeS	PFHpS	PFPeA	PFHpA	PFNA	PFDS	PFDcA	PFDoA	PFTeDA	PFTrDA	PFUnA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	FOSA	MeFOSE	MeFOSA	EtFOSE	EtFOSA	MeFOSAA	EtFOSAA	Sum of PFAS
			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	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			LOR	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.5	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002
PFAS NEMP Human Health Industrial/Commercial				20				50																									
NEMP 2018 Interim Ecological Soil Residential					0.01																												
Location	**Date**	**Type**	**Lab Report**																														
BH01/GW08A	28/05/2019	Normal	EB1913763	0.0004	0.0004	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0004
BH01/GW08A	28/05/2019	Normal	EB1913763	0.0052	0.0044	0.0008	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0052
BH02/GW09	28/05/2019	Normal	EB1913763	0.0013	0.0013	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0013
BH02/GW09*	28/05/2019	Normal	EB1913763	0.004	<0.0002	0.004	0.0006	<0.0002	<0.001	0.0003	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0053
BH02	28/05/2019	Field_D	EB1913763	0.0018	0.0018	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0018
BH02	28/05/2019	Interlab_D	RN1235112	0.0083	0.0083	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.001	<5	<0.002	<0.005	<0.002	<0.002	<0.002	0.0083
BH03/GW10	28/05/2019	Normal	EB1913763	0.0023	0.0023	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0023
BH03/GW10	28/05/2019	Normal	EB1913763	0.0046	0.0046	<0.0002	<0.0002	0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0048

Table T6 Groundwater Analytical Results: PFAS

				PFHxS + PFOS	PFOS	PFHxS	PFHxA	PFOA	PFBA	PFBS	PFPeS	PFHpS	PFPeA	PFHpA	PFNA	PFDS	PFDcA	PFDoA	PFTeDA	PFTrDA	PFUnA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	FOSA	MeFOSE	MeFOSA	EtFOSE	EtFOSA	MeFOSAA	EtFOSAA	Sum of PFAS
			Units	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
			LOR	0.002	0.002	0.002	0.002	0.002	0.01	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.005	0.005	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.002	0.002	0.002
NEMP 2018 Human Health Drinking Water				0.07				0.56																									
NEMP 2018 Human Health Recreational Water				0.7				5.6																									
NEMP 2018 Ecological Marine 99% Species Protection					0.00023			19																									
Location	**Date**	**Type**	**Lab Report**																														
CA01	5/06/2019	Normal	EB1914865	16.2	12.1	4.07	3.87	0.48	0.59	2.22	1.57	0.35	1.17	0.373	0.018	<0.01	<0.01	<0.01	<0.025	<0.01	<0.01	<0.01	<0.01	0.024	<0.01	<0.01	<0.025	<0.025	<0.025	<0.025	<0.01	<0.01	26.8
CA03	5/06/2019	Normal	EB1914865	46.8	33.6	13.2	3.86	1.79	0.16	0.99	1.44	1.14	1.1	1.08	0.175	<0.01	0.04	<0.01	<0.025	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.025	<0.025	<0.025	<0.025	<0.01	<0.01	58.6
CA08	5/06/2019	Normal	EB1914865	0.265	0.158	0.107	0.022	0.03	<0.01	0.005	0.007	0.004	0.007	0.009	0.002	<0.002	0.003	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.354
MW05	5/06/2019	Normal	EB1914865	5.79	4.27	1.52	0.63	0.21	0.12	0.26	0.302	0.162	0.193	0.115	0.013	0.007	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	0.025	0.013	<0.005	0.022	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	7.86
GW01	12/06/2019	Normal	EB1915332	20.2	13.3	6.94	0.939	0.508	0.08	0.319	0.632	0.656	0.21	0.142	0.012	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	23.7
GW02	5/06/2019	Normal	EB1914865	122	70	51.7	18.9	5.66	1.62	9.64	9.13	7.38	6.57	3.78	0.153	<0.01	0.04	<0.01	<0.025	<0.01	<0.01	<0.01	0.157	0.554	<0.01	0.053	<0.025	<0.025	<0.025	<0.025	<0.01	<0.01	185
GW03	5/06/2019	Normal	EB1914865	0.294	0.034	0.26	0.872	0.009	0.1	0.262	0.14	0.003	0.228	0.029	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	1.94
GW04	5/06/2019	Normal	EB1914865	0.026	0.005	0.021	<0.002	<0.002	<0.01	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.029
GW05	4/06/2019	Normal	EB1914865	0.005	<0.002	0.005	<0.002	<0.002	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.005
GW06	12/06/2019	Normal	EB1915332	0.022	0.014	0.008	<0.002	<0.002	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.022
GW07	5/06/2019	Normal	EB1914865	0.049	0.045	0.004	<0.002	<0.002	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.049
GW08A	5/06/2019	Normal	EB1914865	0.252	0.04	0.212	0.039	0.02	0.03	0.019	0.017	0.013	0.016	0.01	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.416
GW09	4/06/2019	Normal	EB1914865	<0.002	<0.002	<0.002	<0.002	<0.002	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002
GW10	4/06/2019	Normal	EB1914865	0.025	0.018	0.007	<0.002	0.006	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	0.031

Table T7 Surface Water Analytical Results: PFAS

					PFHxS + PFOS	PFOS	PFHxS	PFHxA	PFOA	PFBA	PFBS	PFPeS	PFHpS	PFPeA	PFHpA	PFNA	PFDcA	PFDS	PFDoA	PFTeDA	PFTrDA	PFUnA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	FOSA	MeFOSE	MeFOSA	EtFOSE	EtFOSA	MeFOSAA	EtFOSAA	Sum of PFAS
				Units	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				LOR	0.0003	0.0003	0.0005	0.0005	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005	0.001	0.001	0.001	0.001	0.0005	0.0005	0.0003
NEMP 2018 Human Health Recreational Water					0.7				5.6																									
NHMRC 2019 Human Health Recreational Water					2.0				10																									
NEMP 2018 Ecological Marine (99% species protection)						0.00023			19																									
Location	**Sample**	**Date**	**Type**	**Lab Report**																														
On-Site																																		
SW01	SW01_190605	5/06/2019	Normal	EB1914865	0.0115	0.0074	0.0041	0.0009	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0124
SW02	SW02_190605	5/06/2019	Normal	EB1914865	0.0178	0.0061	0.0117	0.0038	0.0013	<0.002	0.0021	0.0019	<0.0005	0.0009	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0284
SW03	SW03_190604	4/06/2019	Normal	EB1914865	0.0403	0.0174	0.0229	0.0074	0.0023	0.006	0.0024	0.0016	<0.0005	0.0009	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0616
SW04	SW04_190604	4/06/2019	Normal	EB1914865	0.3	0.193	0.107	0.0433	0.0254	<0.002	0.0248	0.0121	0.0068	0.0132	0.0097	0.0014	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.438
SW05	SW05_190605	5/06/2019	Normal	EB1914865	5.51	4.25	1.26	0.321	0.165	0.029	0.141	0.152	0.164	0.104	0.0714	0.017	0.0088	<0.0005	<0.0005	<0.0005	<0.0005	0.0017	<0.001	0.003	0.012	<0.001	0.0065	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	6.71
SW06	SW06_190605	5/06/2019	Normal	EB1914865	2.77	1.97	0.802	0.182	0.11	0.015	0.0766	0.0834	0.0714	0.0572	0.0402	0.0123	0.0021	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	0.001	<0.001	0.0017	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	3.42
SW07	SW07_190605	5/06/2019	Normal	EB1914865	0.0508	0.0134	0.0374	0.0038	0.018	<0.002	0.0141	0.0085	<0.002	0.0158	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.111
SW08A	SW08A_190605	5/06/2019	Normal	EB1914865	0.0622	0.0469	0.0153	0.011	0.0111	<0.002	<0.0005	0.0013	0.0012	0.0085	0.0026	0.0006	0.0015	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.1
SW09	SW09_190605	5/06/2019	Normal	EB1914865	3.03	2.21	0.824	0.205	0.108	0.018	0.0788	0.0864	0.0754	0.0656	0.0464	0.0102	0.0024	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	0.002	<0.001	0.0015	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	3.73
Off-Site (Barron River)																																		
SW10	SW10_E	29/03/2019	Normal	EB1908167	0.0004	0.0004	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0004
SW10	QC102	29/03/2019	Field_D	EB1908167	0.0008	0.0008	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0008
SW10	QC201	29/03/2019	Interlab_D	RN1230043	-	<0.002	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.002	<0.005	<0.002	<0.002	<0.002	-
SW10	SW10_F	28/03/2019	Normal	EB1908167	0.0248	0.016	0.0088	0.0035	0.0017	<0.002	0.0012	0.001	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0328
SW11	SW11_E	29/03/2019	Normal	EB1908167	0.0038	0.0024	0.0014	0.0006	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0044
SW11	SW11_F	27/03/2019	Normal	EB1908167	0.0367	0.0241	0.0126	0.0039	0.0021	<0.002	0.002	0.0012	0.0007	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0473
SW12	SW12_E	29/03/2019	Normal	EB1908167	0.001	0.001	<0.0005	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.001
SW12	SW12_F	27/03/2019	Normal	EB1908167	0.0112	0.0072	0.004	0.0013	0.0008	<0.002	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.014
SW13	SW13_E	29/03/2019	Normal	EB1908167	0.0029	0.0018	0.0011	<0.0005	<0.0005	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0029
SW13	SW13_F	27/03/2019	Normal	EB1908167	0.0113	0.0073	0.004	0.0015	0.0008	<0.002	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.0148

Table T8 Sediment Analytical Results: PFAS

Location	Date	Type	Lab Report	PFHxS + PFOS	PFOS	PFHxS	PFHxA	PFOA	PFBA	PFBS	PFPeS	PFHpS	PFPeA	PFHpA	PFNA	PFDcA	PFDS	PFDoA	PFTeDA	PFTrDA	PFUnA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	FOSA	MeFOSE	MeFOSA	EtFOSE	EtFOSA	MeFOSAA	EtFOSAA	Sum of PFAS
			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	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			LOR	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.5	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002
On-Site																																	
SS01	5/06/2019	Normal	EB1914865	0.0008	0.0008	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0008
SS02	5/06/2019	Normal	EB1914865	0.0004	0.0004	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0004
SS03	4/06/2019	Normal	EB1914865	0.0017	0.0017	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0017
SS04	4/06/2019	Normal	EB1914865	0.0047	0.006	0.0002	<0.0002	0.0004	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0056
SS05	5/06/2019	Normal	EB1914865	0.196	0.178	0.0177	0.0036	0.0026	<0.001	0.0016	0.0027	0.0024	0.0016	0.0007	0.0012	0.0011	0.0004	0.0008	<0.0006	<0.0002	0.0009	<0.0005	<0.0005	0.0011	<0.0005	0.0013	<0.6	<0.0006	<0.0006	<0.0006	<0.0002	<0.0002	0.218
SS06	5/06/2019	Normal	EB1914865	1.79	1.6	0.194	0.0158	0.0249	0.002	0.0033	0.0087	0.0188	0.0057	0.006	0.009	0.0028	0.0035	0.002	<0.0005	0.0003	0.0018	<0.0005	<0.0005	<0.0005	<0.0005	0.0022	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	1.9
SS07	5/06/2019	Normal	EB1914865	0.0039	0.0033	0.0006	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0039
SS08A	5/06/2019	Normal	EB1914865	0.0024	0.0024	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	0.0004	0.0009	0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0043
SS09*	5/06/2019	Normal	EB1914865	0.417	0.317	0.0999	0.0295	0.0098	<0.003	0.0139	0.0138	0.0066	0.0108	0.0089	0.0014	0.0008	0.001	0.001	<0.0006	0.0002	0.001	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	<0.6	<0.0006	<0.0006	<0.0006	<0.0002	<0.0002	0.517
SS09	5/06/2019	Field_D	EB1914865	0.444	0.331	0.113	0.0296	0.0108	<0.003	0.0116	0.015	0.0082	0.0113	0.0091	0.002	0.0009	0.0004	0.0006	<0.0006	0.0003	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	0.001	<0.6	<0.0006	<0.0006	<0.0006	<0.0002	<0.0002	0.546
SS09	5/06/2019	Interlab_D	RN1236817	0.97	0.8	0.17	0.028	0.016	<0.01	0.012	0.015	0.012	0.015	0.0095	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	1.0775
Off-Site (Barron River)																																	
SS10	28/03/2019	Normal	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
SS10	28/03/2019	Field_D	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
SS10	28/03/2019	Interlab_D	RN1230043	<0.0002	<0.002	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.001	<5	<0.002	<0.005	<0.002	<0.002	<0.002	<0.0002
SS11	27/03/2019	Normal	EB1908167	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002
SS12	27/03/2019	Normal	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
SS13	27/03/2019	Normal	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
PW10	28/03/2019	Normal	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
PW10	28/03/2019	Field_D	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
PW11	27/03/2019	Normal	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002
PW12	27/03/2019	Normal	EB1908167	0.0004	0.0004	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0004
PW13	27/03/2019	Normal	EB1908167	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.5	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	0.0002

Note that pore water (PW) has been assessed as sediment in this investigation (refer to **Section 1.4**).

			Sum of PFAS	PFHxS + PFOS	PFOS	PFHxS	PFHxA	PFOA	PFBA	PFBS	PFPeS	PFHpS	PFPeA	PFHpA	PFNA	PFDcA	PFDS	PFDoA	PFTeDA	PFTrDA	PFUnA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	FOSA	MeFOSE	MeFOSA	EtFOSE	EtFOSA	MeFOSAA	EtFOSAA	weight of sample
		Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	g
		LOR	1		1	1	1	1	5	1	1	1	2	1	1	1	2	2	2	2	1	2	2	2	2	5	2	5	2	2	1	1	0.1
FSANZ 2017 2 years + Finfish (all) (Adult)					11	11		91																									
FSANZ 2017 2-6 years Finfish (all) (Child)					5.2	5.2		41																									
NEMP 2018 Ecological direct exposure for wildlife diet - Mammalian diet biota ww food				4.6																													
NEMP 2018 Ecological direct exposure for wildlife diet - Avian diet biota ww food				8.2																													
Field ID	**Date**	**Species**																															
BIO10_A	28/03/2019	Pikey Bream	4	4	4	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	55.6
BIO10_B	27/03/2019	Mud Crab	1	1	1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	18.6
BIO10_C	27/03/2019	Mud Crab	1	1	1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	37.2
BIO10_D	29/03/2019	Mud Crab	4	4	4	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	14
BIO11_A	28/03/2019	Oxeye Herring	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	122
BIO11_B	28/03/2019	Giant Leatherskin	1	1	1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	49.1
BIO11_C	28/03/2019	Giant Leatherskin	2	2	2	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	58.3
BIO11_D	28/03/2019	Mud Crab	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	39.5
BIO12_A	28/03/2019	Giant Trevally	2	2	2	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	71.2
BIO12_B	28/03/2019	Giant Leatherskin	2	2	2	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	43.9
BIO12_C	28/03/2019	Bream (Yellow fin)	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	35.7
BIO12_D	28/03/2019	Sicklefish	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	38
BIO13_A	27/03/2019	Giant Trevally	4	4	4	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	45.5
BIO13_B	27/03/2019	Giant Leatherskin	2	2	2	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	49.3
BIO13_C	28/03/2019	Giant Trevally	2	2	2	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	43.8
BIO13_D	28/03/2019	Giant Trevally	2	2	2	<1	<1	<1	<5	<1	<1	<1	<2	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<5	<2	<5	<2	<2	<1	<1	66.5

				Alkalinity					Nutrients	Major Ions									
				Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Hardness as CaCO3 (Filtered)	Reactive Phosphorus (as P)	Chloride	Calcium	Fluoride	Magnesium	Potassium	Sodium	Total Anions	Total Cations	Sulfate (as SO4-) (Filtered)	Ionic Balance
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%
			LOR	1	1	1	1		0.01	1	1	0.1	1	1	1	0.01	0.01	1	0.01
NHMRC ADWG (2018) Human Health												1.5							
NHMRC ADWG (2018) Aesthetic										250								250	
Location	**Sample**	**Date**	**Lab Report**																
CA01	CA01_190605	5/06/2019	EB1914865	21	<1	<1	21	18	<0.01	9	4	<0.1	2	2	11	0.84	0.89	8	-
CA03	CA03_190605	5/06/2019	EB1914865	68	<1	<1	68	224	<0.01	366	50	0.2	24	13	158	12.3	11.7	31	2.72
CA08	CA08_190605	5/06/2019	EB1914865	32	<1	<1	32	26	0.17	10	7	<0.1	2	2	11	1.02	1.04	5	-
MW05	MW05_190605	5/06/2019	EB1914865	28	<1	<1	28	23	0.03	10	6	<0.1	2	2	11	0.97	0.99	6	-
GW01	GW01_190612	12/06/2019	EB1915332	200	<1	<1	200	166	0.28	484	22	0.4	27	18	289	17.6	16.4	<1	3.82
GW02	GW02_190605	5/06/2019	EB1914865	552	<1	<1	552	2810	0.04	8060	251	1	531	193	5380	250	295	563	8.26
GW03	GW03_190605	5/06/2019	EB1914865	946	<1	<1	946	11,100	0.47	22,600	785	0.6	2220	563	15,900	791	928	6460	7.97
GW04	GW04_190605	5/06/2019	EB1914865	108	<1	<1	108	165	0.13	15	48	<0.1	11	11	19	4.02	4.41	69	4.64
GW05	GW05_190604	4/06/2019	EB1914865	133	<1	<1	133	501	<0.01	130	49	1.2	92	36	196	19.2	19.5	621	0.54
GW06	GW06_190612	12/06/2019	EB1915332	91	<1	<1	91	936	0.2	2960	68	0.5	186	66	1510	92.6	86.1	348	3.63
GW07	GW07_190605	5/06/2019	EB1914865	1210	<1	<1	1210	9780	1.18	22,300	749	0.9	1920	532	14,600	702	844	2340	9.19
GW08A	GW08A_190605	5/06/2019	EB1914865	369	<1	<1	369	408	<0.01	793	81	0.2	50	23	500	32.3	30.5	124	2.91
GW09	GW09_190604	4/06/2019	EB1914865	10	<1	<1	10	13	<0.01	14	2	<0.1	2	3	12	0.74	0.86	7	-
GW10	GW10_190604	4/06/2019	EB1914865	14	<1	<1	14	28	0.02	39	3	0.2	5	4	29	1.75	1.92	18	-

Table T11 Surface Water Analytical Results: TRH, BTEXN, Metals, Major Ions and Coliforms

				TRH							MAH								Metals								Alkalinity					Nutrients	Major Ions												
				C6-C10 fraction	C6-C10 fraction (minus BTEX)(F1)	>C10-C16 fraction	>C10-C16 (minus Naphthalene)(F2)	>C16-C34 fraction	>C34-C40 fraction	>C10-C40 fraction (sum)	Benzene	Toluene	Ethylbenzene	m&p-Xylene	o-Xylene	Total Xylenes	Total BTEX	Naphthalene (VOC)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Hardness as CaCO3 (Filtered)	Reactive Phosphorus (as P)	Chloride	Calcium	Fluoride	Magnesium	Potassium	Sodium	Total Anions	Total Cations	Sulfate (as SO4-) (Filtered)	Ionic Balance	E. Coli	Faecal Coliform	Total Coliforms
			Units	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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	CFU/100mL	CFU/100mL	CFU/100mL
			LOR	20	20	100	100	100	100	100	1	2	2	2	2	2	1	5	1	0.1	1	1	1	0.1	1	5	1	1	1	1		0.01	1	1	0.1	1	1	1	0.01	0.01		0.01	1	1	1
NEPM GIL (2013) / ANZG (2018) Marine Water											500	180	5	75	350			50	24*	0.7	27	1.3	4.4	0.1	7	15																			
HMGV ANZG (2018) Marine Water																				6.02	199		95		55	117																			
ANZECC (2000) Section 5.2.2 Primary contact (swimming)																																											-	150 (median)	-
ANZECC (2000) Section 5.2.2 Secondary contact (boating)																																												1000 (median)	
Barron River Basin Environmental Values and Water Quality Objectives																																											< 50		
Location	**Date**	**Type**	**Lab Report**																																								-	-	-
On-Site																																													
SW01	5/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121	<1	<1	121	7370	<0.01	18,800	478	0.8	1500	459	12,600	596	707	3060	8.49	-	-	-
SW02	5/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162	<1	<1	162	5450	<0.01	14,100	367	0.8	1100	348	9370	449	525	2290	7.87	-	-	-
SW03	4/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	<1	<1	168	3960	<0.01	10,900	276	0.6	795	245	6880	345	385	1640	5.45	-	-	-
SW04	4/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49	<1	<1	49	264	0.03	747	30	0.1	46	24	425	24.4	24.4	112	<0.01	-	-	-
SW05	5/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	<1	<1	25	337	<0.01	887	46	0.2	54	22	472	28.5	27.8	142	1.14	-	-	-
SW06	5/06/2019	Normal	EB1914865	<20	<20	<100	<100	150	<100	150	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	3	7	18	<1	<1	18	314	<0.01	868	40	0.2	52	21	465	27.7	27	136	1.16	-	-	-
SW06	5/06/2019	Field D	EB1914865	<20	<20	<100	<100	160	<100	160	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	3	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW06	5/06/2019	Interlab_D	660605	<20	<20	<50	<50	<100	<100	<100	<1	<1	<1	<2	<1	<3	-	-	1	<0.2	<1	<1	<1	<0.1	<1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW07	5/06/2019	Normal	EB1914865	<20	<20	140	140	1780	310	2230	<1	<2	<2	<2	<2	<2	<1	<5	23	1	20	89	52	<0.1	63	726	424	<1	<1	424	5500	0.01	14,500	420	0.7	1080	306	9400	459	526	1980	6.88	-	-	-
SW08A	5/06/2019	Normal	EB1914865	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	2	<1	<0.1	2	22	56	<1	<1	56	160	0.09	480	21	0.1	26	21	270	16.2	15.5	73	2.24	-	-	-
SW09	5/06/2019	Normal	EB1914865	<20	<20	<100	<100	300	110	410	<1	<2	<2	<2	<2	<2	<1	<5	10	0.5	3	6	4	<0.1	12	92	16	<1	<1	16	316	<0.01	866	39	0.2	53	21	471	27.6	27.3	138	0.53	-	-	-
Off-Site (Barron River)																																													
SW10	29/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	280	560	5700
SW10	29/03/2019	Field D	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320	480	2900
SW10	28/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	<1	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	130	1800
SW11	29/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	190	2300
SW11	27/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64	200	1000
SW12	29/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	2	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70	290	1100
SW12	27/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	160	730
SW13	29/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79	150	730
SW13	27/03/2019	Normal	EB1908167	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<5	1	<0.1	<1	<1	<1	<0.1	<1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	250	5700

Table T12 Sediment Analytical Results: TRH, BTEXN, Metals, Major Ions

					TRH							MAH								Metals									Alkalinity			Nutrients	Major Ions						
					C6-C10 fraction	C6-C10 fraction (minus BTEX)(F1)	>C10-C16 fraction	>C10-C16 (minus Naphthalene)(F2)	>C16-C34 fraction (F3)	>C34-C40 fraction (F4)	>C10-C40 fraction (sum)	Benzene	Toluene	Ethylbenzene	m&p-Xylene	o-Xylene	Total Xylenes	Total BTEX	Naphthalene (VOC)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Moisture Content	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Reactive Phosphorus (as P)	Chloride	Calcium	Fluoride	Magnesium	Potassium	Sodium	Sulfate as SO4
				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	mg/kg	mg/kg	mg/kg	mg/kg
				LOR	10	10	50	50	100	100	50	0.2	0.5	0.5	0.5	0.5	0.5	0.2	1	5	1	2	5	5	0.1	2	5	0.1	1	1	1	0.1	10	10	1	10	10	10	10
NEPM (2013) HIL																				3000	900	3600	240000	1500	730	6000	400000												
ANZG 2018 - DGV																				20	1.5	80	65	50	0.15	21	200												
ANZG 2018 -GV-high																				70	10	370	270	220	1	52	410												
Location	**Sample**	**Date**	**Type**	**Lab Report**																																			
On-Site																																							
SS01	SS01_190605	5/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.1	770	<5	770	<0.1	9070	120	3	420	330	4760	1210
SS02	SS02_190605	5/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.6	1790	<5	1790	<0.1	10,300	140	6	440	450	6200	1670
SS03	SS03_190604	4/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37.5	44	<5	44	<0.1	7000	90	5	260	260	3320	1010
SS04	SS04_190604	4/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.6	26	<5	26	0.2	3650	40	2	110	140	1860	760
SS05	SS05_190605	5/06/2019	Normal	EB1914865	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80.8	52	<5	52	<0.2	5210	510	3	760	450	2860	1190
SS06	SS06_190605	5/06/2019	Normal	EB1914865	<10	<10	<50	<50	260	200	460	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	28	<1	24	39	22	<0.1	15	107	70.8	79	<5	79	3	530	40	7	20	110	710	610
SS07	SS07_190605	5/06/2019	Normal	EB1914865	<10	<10	<50	<50	110	110	220	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	8	<1	19	18	15	<0.1	19	62	31	9	<5	9	0.2	5840	310	1	450	100	2600	920
SS08A	SS08A_190605	5/06/2019	Normal	EB1914865	<10	<10	<50	<50	140	110	250	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	6	<1	17	71	33	0.4	8	131	25.3	26	<5	26	2.4	490	<10	1	<10	20	330	80
SS09	SS09_190605	5/06/2019	Normal	EB1914865	<10	<10	130	130	970	420	1520	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.2	<1	54	<1	11	23	14	<0.1	62	431	84.6	70	<5	70	<0.2	9370	580	4	920	380	5200	1020
Off-Site (Barron River)																																							
SS10	SS10	28/03/2019	Normal	EB1908167	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	18	<1	33	15	21	<0.1	16	55	61.8	-	-	-	-	-	-	-	-	-	-	-
SS10	QC100	28/03/2019	Field_D	EB1908167	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	18	<1	33	16	21	<0.1	15	56	63.8	-	-	-	-	-	-	-	-	-	-	-
SS10	QC200	28/03/2019	Interlab_D	RN1230043	<25	<25	<50	<50	<100	<100	-	<0.5	<0.5	<0.5	<1	<0.5	-	-	-	15	<0.5	36	17	19	<0.2	19	58	-	-	-	-	-	-	-	-	-	-	-	-
SS11	SS11	27/03/2019	Normal	EB1908167	<10	<10	<50	<50	100	<100	100	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	6	<1	14	8	9	<0.1	7	23	41.9	-	-	-	-	-	-	-	-	-	-	-
SS12	SS12	27/03/2019	Normal	EB1908167	<10	<10	50	50	<100	<100	50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	14	<1	23	12	14	<0.1	10	39	60.2	-	-	-	-	-	-	-	-	-	-	-
SS13	SS13	27/03/2019	Normal	EB1908167	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	22	<1	33	18	24	<0.1	16	54	68.9	-	-	-	-	-	-	-	-	-	-	-
PW10	PW10	28/03/2019	Normal	EB1908167	<10	<10	50	50	<100	<100	50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	18	<1	31	14	22	<0.1	13	54	63.9	-	-	-	-	-	-	-	-	-	-	-
PW10	QC101	28/03/2019	Field_D	EB1908167	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	16	<1	33	15	22	<0.1	14	55	63.4	-	-	-	-	-	-	-	-	-	-	-
PW11	PW11	27/03/2019	Normal	EB1908167	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	6	<1	13	8	9	<0.1	6	22	40.9	-	-	-	-	-	-	-	-	-	-	-
PW12	PW12	27/03/2019	Normal	EB1908167	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	16	<1	26	13	18	<0.1	10	44	60.8	-	-	-	-	-	-	-	-	-	-	-
PW13	PW13	27/03/2019	Normal	EB1908167	<10	<10	80	80	150	<100	230	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1	18	<1	34	19	24	<0.1	16	56	68.3	-	-	-	-	-	-	-	-	-	-	-

Location	Depth	Date	N,N-diethyl-meta-toluamide (DEET)	+1180µm	+150µm	+19.0mm	+2.36mm	+300µm	+37.5mm	+4.75mm	+425µm	+600µm	+75.0mm	+75µm	+9.5mm	<2 µm (Clay)	2-60 µm (Silt)	0.06-2mm (Sand)	>2mm (Gravel)	>6cm (Cobbles)	PFDS	PFHxS	PFHxS	PFOS	PFBA	8:2 diPAP	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDcA	PFUnA	PFDoA	PFTrDA	PFTeDA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	MeFOSAA	EtFOSAA
			-	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	0.5-0.5	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0015	0.271	0.0029	0.268	<0.001	<0.0005	0.0009	0.0018	0.0004	-	0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
BH01	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	4-4	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	0.5-0.5	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0326	1.15	0.0276	1.12	0.005	0.0066	0.0041	0.0112	0.0023	-	0.0062	0.0058	0.0016	0.0021	0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
BH02	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	2-2	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0007	0.296	0.0205	0.276	<0.001	<0.0005	0.0012	0.0055	0.0009	-	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
CA04_1		19/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.128	-	-	-	-	-	0.0009	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA04_2		19/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.146	-	-	-	-	-	0.0008	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA05_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.93	-	-	-	-	-	0.0234	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA05_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0555	-	-	-	-	-	0.0008	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA06_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.98	-	-	-	-	-	0.0362	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA06_2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.888	-	-	-	-	-	0.047	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA07_2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.35	-	-	-	-	-	0.0929	-	-	-	-	-	-	-	0.03	<0.001	-	-	-
CA07_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0225	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	0.005	<0.001	-	-	-
CA07_5		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA08_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0261	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CA08_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0168	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CASED1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CASED2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0228	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	<0.005	<0.001	-	-	-
CASED3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.202	-	-	-	-	-	0.0053	-	-	-	-	-	-	-	<0.005	0.002	-	-	-
GW01	1.3-1.5	6/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.381	0.0334	0.348	<0.001	<0.0005	0.0002	0.007	0.0011	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW01	2.8-3	6/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0062	0.0013	0.0049	<0.001	<0.0005	<0.0002	0.0003	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW01	3.3-3.5	6/05/2017	-	10	78	<1	<1	73	<1	<1	62	40	<1	79	<1	10	11	75	4	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	0.8-1	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0016	0.371	0.0137	0.357	<0.001	0.004	0.0022	0.0045	0.0014	-	0.0004	0.0016	0.0016	0.0019	0.0006	<0.0005	<0.0005	<0.0005	-	0.0007	<0.0002	<0.0005
GW02	3-8.4	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0729	0.0235	0.0494	<0.001	<0.0005	<0.0002	0.0087	0.0011	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW03	1.3-1.5	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0505	0.0017	0.0488	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW03	2.8-3	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0031	0.0008	0.0023	<0.001	<0.0005	<0.0002	0.0005	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW04	1.3-1.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	2.8-3	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW05	0.3-0.5	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0012	<0.0002	0.0012	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW05	1.8-2	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW05	2.3-2.5	5/05/2017	-	13	41	<1	5	28	<1	<1	25	21	<1	49	<1	20	30	43	7	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	1.3-1.5	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0068	<0.0002	0.0068	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW06	3.8-4	5/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW07	0.3-0.5	6/05/2017	<0.0005	41	55	<1	34	50	<1	26	48	46	<1	63	7	9	26	29	36	<1	<0.0002	0.0002	<0.0002	0.0002	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005
GW07	2.8-3	6/05/2017	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	0.0003	<0.0002	0.0003	<0.001	<0.0005	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0002	<0.0005

Location	Depth	Date	FOSA	MeFOSA	Sum of PFAS	pH (Lab)	Perfluorobutane Sulfonate	C6-C10 fraction	C6-C10 fraction (minus BTEX)(F1)	>C10-C16 fraction	>C10-C16 (minus Naphthalene)(F2)	>C16-C34 fraction	>C34-C40 fraction	>C10-C40 fraction (sum)	Benzene	Toluene	Ethylbenzene	m&p-Xylene	o-Xylene	Total Xylenes	Total BTEX	Naphthalene	Acenaphthylene	Acenaphthene	Anthracene	Fluorene	Phenanthrene	Fluoranthene	Benz(a)anthracene	Benzo(k)fluoranthene	Benzo(b&j)fluoranthene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (zero)	Chrysene	Pyrene	Benzo(g,h,i)perylene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene
			mg/kg	mg/kg	mg/kg	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	mg/kg	mg/kg
BH01	0.5-0.5	3/11/2017	0.0018	<0.0005	0.28	-	<0.0002	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH01	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	4-4	3/11/2017	-	-	-	-	-	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH02	0.5-0.5	3/11/2017	0.0256	<0.0005	1.27	-	0.0021	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH02	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	2-2	3/11/2017	0.0004	<0.0005	0.316	-	0.002	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CA04_1		19/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA04_2		19/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA05_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA05_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA06_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA06_2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_5		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA08_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA08_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	1.3-1.5	6/05/2017	<0.0002	<0.0005	0.407	6	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	2.8-3	6/05/2017	<0.0002	<0.0005	0.0065	9	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	3.3-3.5	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	0.8-1	5/05/2017	0.0018	<0.0005	0.4	7.9	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	3-8.4	5/05/2017	<0.0002	<0.0005	0.0933	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW03	1.3-1.5	5/05/2017	<0.0002	<0.0005	0.0512	-	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW03	2.8-3	5/05/2017	<0.0002	<0.0005	0.0036	-	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	1.3-1.5	5/05/2017	-	-	-	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	2.8-3	5/05/2017	<0.0002	<0.0005	<0.0002	-	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	0.3-0.5	5/05/2017	<0.0002	<0.0005	0.0012	4	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	1.8-2	5/05/2017	<0.0002	<0.0005	<0.0002	8.2	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	2.3-2.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	1.3-1.5	5/05/2017	<0.0002	<0.0005	0.0068	7.7	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	3.8-4	5/05/2017	<0.0002	<0.0005	<0.0002	7.4	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW07	0.3-0.5	6/05/2017	<0.0002	<0.0005	0.0002	9.2	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW07	2.8-3	6/05/2017	<0.0002	<0.0005	0.0003	8.6	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Location	Depth	Date	Sum of PAHs	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc	DENSITY	Electrical conductivity (lab)	Calcium/Magnesium Ratio	Cation Exchange Capacity	Exchangeable Sodium Percent	Magnesium/Potassium Ratio	Potassium	Aldrin	Dieldrin	Aldrin + Dieldrin	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	cis-Chlordane	trans-Chlordane	DDD	DDE	DDT	DDT+DDE+DDD	Endosulfan
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	kg/m3	µS/cm	-	meq/100g	%	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	0.5-0.5	3/11/2017	<0.5	-	<5	<1	5	<5	-	<5	-	<0.1	<2	<5	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05
BH01	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	4-4	3/11/2017	<0.5	-	9	<1	24	7	-	12	-	<0.1	11	31	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05
BH02	0.5-0.5	3/11/2017	<0.5	-	11	<1	10	25	-	23	-	<0.1	9	77	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05
BH02	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	2-2	3/11/2017	<0.5	-	5	<1	6	<5	-	<5	-	<0.1	7	26	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05
CA04_1		19/05/2014	-	-	<5	<1	11	13	-	10	-	<0.1	7	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA04_2		19/05/2014	-	-	<5	<1	<2	<5	-	<5	-	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA05_1		20/05/2014	-	-	26	<1	27	26	-	10	-	<0.1	22	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA05_3		20/05/2014	-	-	<5	<1	<2	<5	-	<5	-	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA06_1		20/05/2014	-	-	26	<1	28	30	-	10	-	<0.1	27	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA06_2		20/05/2014	-	-	<5	<1	6	<5	-	<5	-	<0.1	2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_2		20/05/2014	-	-	<5	<1	3	<5	-	<5	-	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_3		20/05/2014	-	-	<5	<1	<2	<5	-	<5	-	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_5		20/05/2014	-	-	18	<1	38	14	-	18	-	<0.1	19	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA08_1		20/05/2014	-	-	7	<1	20	27	-	12	-	<0.1	16	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA08_3		20/05/2014	-	-	<5	<1	<2	<5	-	<5	-	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED1		20/05/2014	-	-	5	<1	18	10	-	18	-	<0.1	5	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED2		20/05/2014	-	-	14	<1	13	28	-	12	-	<0.1	7	88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED3		20/05/2014	-	-	16	<1	27	10	-	13	-	<0.1	7	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	1.3-1.5	6/05/2017	-	<4390	7	<1	10	7	6890	-	155	-	-	33	-	25	2.6	4.4	3.9	6.5	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	2.8-3	6/05/2017	-	11,200	13	<1	28	9	23,700	-	408	-	-	36	-	919	0.9	8.9	20.9	6.5	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	3.3-3.5	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	0.00255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	0.8-1	5/05/2017	-	7720	8	<1	14	47	15,900	-	1040	-	-	49	-	32	1.4	<0.2	<0.2	-	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	3-8.4	5/05/2017	-	5780	9	<1	19	6	12,200	-	304	-	-	21	-	-	-	-	-	-	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW03	1.3-1.5	5/05/2017	-	12,400	15	<1	27	16	30,600	-	599	-	-	72	-	-	-	-	-	-	190	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW03	2.8-3	5/05/2017	-	12,000	23	<1	37	16	29,600	-	304	-	-	62	-	-	-	-	-	-	460	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	1.3-1.5	5/05/2017	-	4980	<5	<1	14	6	11,200	-	76	-	-	15	-	573	-	1.4	<0.2	-	<40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	2.8-3	5/05/2017	-	6100	12	<1	20	6	15,600	-	27	-	-	11	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	0.3-0.5	5/05/2017	-	12,400	13	<1	28	13	27,600	-	164	-	-	38	-	685	0.4	8	2.1	6.9	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	1.8-2	5/05/2017	-	7580	8	<1	20	6	12,400	-	79	-	-	22	-	235	<0.2	2.6	24.2	5.9	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	2.3-2.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	0.00288	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	1.3-1.5	5/05/2017	-	8480	8	<1	16	29	17,900	-	1140	-	-	36	-	138	<0.2	0.9	45.8	-	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	3.8-4	5/05/2017	-	1690	<5	<1	5	<5	3600	-	53	-	-	8	-	100	2.2	0.2	<0.2	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW07	0.3-0.5	6/05/2017	-	8140	7	<1	11	22	17,400	-	823	-	-	35	0.00283	819	5.3	3	10	-	<60	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW07	2.8-3	6/05/2017	-	9920	16	<1	26	8	20,900	-	364	-	-	31	-	4160	0.9	9.8	23.7	6.1	380	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Location	Depth	Date	Endosulfan 1	Endosulfan 2	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Hexachlorobenzene (HCB)	Methoxychlor	Azinphos Methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Demeton-S-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenamiphos	Fenthion	Malathion	Monocrotophos	Parathion	Parathion-methyl	Pirimphos-ethyl	Prothiofos	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ calc (Zero)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	0.5-0.5	3/11/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	0.6	1.2
BH01	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	4-4	3/11/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	0.6	1.2
BH02	0.5-0.5	3/11/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	0.6	1.2
BH02	1-1	3/11/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	2-2	3/11/2017	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.2	<0.05	<0.05	0.6	1.2
CA04_1		19/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA04_2		19/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA05_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA05_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA06_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA06_2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA07_5		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA08_1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA08_3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED1		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED2		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASED3		20/05/2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	1.3-1.5	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	2.8-3	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW01	3.3-3.5	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	0.8-1	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW02	3-8.4	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW03	1.3-1.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW03	2.8-3	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	1.3-1.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW04	2.8-3	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	0.3-0.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	1.8-2	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW05	2.3-2.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	1.3-1.5	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW06	3.8-4	5/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW07	0.3-0.5	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW07	2.8-3	6/05/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table T14 Historical Groundwater Analytical Results

				PFAS																						
Location	Date	PFPeS	PFDS	PFHxS	PFOS	PFBA	8:2 diPAP	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDcA	PFUnA	PFDoA	PFTrDA	PFTeDA	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	MeFOSAA	EtFOSAA	FOSA	N-Me-FOSA	Sum of PFAS
		µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CA3	28/05/2014	-	-	-	4.57	-	-	-	-	-	0.32	-	-	-	-	-	-	-	<100	<100	-	-	-	-	-	-
CA4	28/05/2014	-	-	-	44.3	-	-	-	-	-	1.44	-	-	-	-	-	-	-	100	<100	-	-	-	-	-	-
CA8	28/05/2014	-	-	-	1.81	-	-	-	-	-	0.1	-	-	-	-	-	-	-	<100	<100	-	-	-	-	-	-
MW5	28/05/2014	-	-	-	28.9	-	-	-	-	-	1.13	-	-	-	-	-	-	-	100	<100	-	-	-	-	-	-
EW03	22/05/2017	0.27	<0.02	7.57	5.23	<0.1	<0.05	0.18	0.65	0.18	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	-	<0.05	<0.02	<0.05	<0.02	<0.05	9.57
GW01	22/05/2017	1.32	<0.02	42.9	29.6	0.4	<0.05	0.54	2.37	0.38	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	-	<0.05	<0.02	<0.05	<0.02	<0.05	51.7
GW02	22/05/2017	6.55	0.03	135	101	4.5	3.33	15.2	20.6	4.3	-	0.62	0.1	<0.02	<0.02	<0.02	<0.05	<0.05	0.82	-	<0.05	<0.02	<0.05	0.27	<0.05	210
GW03	22/05/2017	0.14	<0.05	0.24	0.14	0.4	<0.05	0.1	0.64	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	-	<0.05	<0.05	<0.12	<0.05	<0.12	1.79
GW04	22/05/2017	0.05	<0.02	0.31	0.03	<0.1	<0.05	<0.02	0.03	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	-	<0.05	<0.02	<0.05	<0.02	<0.05	0.43
GW05	22/05/2017	<0.02	<0.02	0.22	0.19	<0.1	<0.05	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	-	<0.05	<0.02	<0.05	<0.02	<0.05	0.22
GW06	22/05/2017	<0.02	<0.02	0.04	0.02	<0.1	<0.05	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	-	<0.05	<0.02	<0.05	<0.02	<0.05	0.04
GW07	22/05/2017	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	-	<0.05	<0.05	<0.12	<0.05	<0.12	<0.05

			Metals								Alkalinity					Major Ions		Field						
Location	Date	Total Dissolved Solids	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	Hydroxide Alkalinity	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Chloride	Sulfate as SO4 (Filtered)	DO (Field)	pH (Field)	Temperature	Electrical conductivity (field)	Redox Potential (Field)	Perfluorobutane Sulfonate	Perfluorohexane sulfonate (PFHxS)
		mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	pH Units	°C	µS/cm	mV	ug/L	µg/L
CA3	28/05/2014	-	<1	<0.1	<1	<1	<1	<0.1	1	76	-	44	<1	<1	44	28	51	-	-	-	-	-	-	-
CA4	28/05/2014	-	<1	<0.1	<1	<1	<1	<0.1	2	6	-	16	<1	<1	16	21	25	-	-	-	-	-	-	-
CA8	28/05/2014	-	<1	<0.1	<1	1	<1	<0.1	<1	11	-	21	<1	<1	21	23	10	-	-	-	-	-	-	-
MW5	28/05/2014	-	<1	<0.1	<1	1	<1	<0.1	<1	11	-	25	<1	<1	25	27	11	-	-	-	-	-	-	-
EW03	22/05/2017	206	-	-	-	-	-	-	-	-	<1	48	<1	48	-	-	-	110	5.88	28.3	347	23.8	0.2	2.34
GW01	22/05/2017	1030	-	-	-	-	-	-	-	-	<1	222	<1	222	-	-	-	100	6.36	28.8	2038	-138.9	0.86	13.3
GW02	22/05/2017	6910	-	-	-	-	-	-	-	-	<1	314	<1	314	-	-	-	640	6.5	29	13,556	-40.2	6.27	34.4
GW03	22/05/2017	53,800	-	-	-	-	-	-	-	-	<1	1090	<1	1090	-	-	-	80	6.69	30.5	74,424	-88.4	0.27	0.1
GW04	22/05/2017	585	-	-	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	140	4.05	28.7	809	78.8	0.04	0.28
GW05	22/05/2017	2010	-	-	-	-	-	-	-	-	<1	298	<1	298	-	-	-	130	6.13	28.7	3261	-81.5	<0.02	0.03
GW06	22/05/2017	9220	-	-	-	-	-	-	-	-	<1	265	<1	265	-	-	-	100	6.12	28.5	15,482	-84.4	<0.02	0.02
GW07	22/05/2017	48,800	-	-	-	-	-	-	-	-	<1	1360	<1	1360	-	-	-	100	6.54	30.7	70,397	-117.4	<0.05	<0.05

Location	Sample	Date	PFPeS	PFDS	PFHxS	PFOS	PFBA	8:2 diPAP	PFPeA	PFHxA	PFHpA	PFNA	PFDcA	PFUnA	PFDoA	PFTrDA	PFTeDA	4:2 FTS	6:2 FTS	10:2 FTS	MeFOSAA	EtFOSAA	FOSA	MeFOSA	Sum of PFAS	Total Dissolved Solids	Hydroxide Alkalinity	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3
			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	mg/L	mg/L	mg/L	mg/L
SW01	SW01	22/05/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.12	<0.12	<0.05	<0.05	132	<1	132
SW02	SW02	22/05/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.12	<0.12	<0.05	<0.05	191	<1	191
SW03	SW03	23/05/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.12	<0.12	<0.05	<0.05	199	<1	199
SW04	SW04	23/05/2017	<0.2	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	<0.05	0.1	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.12	<0.12	<0.12	0.1	<0.05	90	<1	90

Table T16 Historical Sediment Analytical Results

			PFHxS	PFOS	PFBA	PFPeA	PFHxA	PFHpA	PFDS	PFNA	PFDcA	PFUnA	PFDoA	PFTrDA	PFTeDA	4:2 FTS	6:2 FTS	10:2 FTS	MeFOSAA	EtFOSAA	FOSA	8:2 diPAP	N-Me-FOSA	Sum of PFAS	pH (Lab)	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Manganese	Zinc	Electrical conductivity (lab)	Calcium/Magnesium Ratio	Cation Exchange Capacity	Exchangeable Sodium Percent	Magnesium/Potassium Ratio	Potassium	N,N-diethyl-meta-toluamide (DEET)	Moisture Content (dried @ 103°C)
Location	**Sample**	**Date**	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µS/cm	-	meq/100g	%	-	mg/kg	mg/kg	%
SS01	SS01	23/05/2017	0.0031	0.0031	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	0.0031	7.8	15,100	25	<1	31	24	37,900	1700	69	2670	0.3	7.2	36.7	5.6	240	<0.0005	42.8
SS02	SS02	23/05/2017	0.001	0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	0.0012	6.9	16,100	30	<1	37	20	55,800	324	103	4170	0.4	18	16.3	6.3	470	<0.0005	49.8
SS04	SS04	23/05/2017	0.001	0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	0.001	7.7	8690	9	<1	19	10	14,700	245	36	2380	0.4	4.9	32.1	8	170	<0.0005	29.5

Appendix C

Photographs

PHOTOGRAPHIC LOG

Site Name:
Cairns Airport, Queensland

Site Location:
Cairns Airport, Queensland

Project No:
60597459

Plate No. 1

Date: 28/05/2019

Direction Photo Taken:

South to north

Description:

Newly installed monitoring well GW09

PHOTOGRAPHIC LOG

Site Name:
Cairns Airport, Queensland

Site Location:
Cairns Airport, Queensland

Project No:
60597459

Plate No. 2

Date: 28/05/2019

Direction Photo Taken:

East to west

Description:

Newly installed monitoring well GW10

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No. 3

Date: 28/05/2019

Direction Photo Taken:

East to west

Description:

Newly installed monitoring well GW08A

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No. 4

Date: 05/06/2019

Direction Photo Taken:

-

Description:

Monitoring well MW05

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No. 5

Date: 5/06/2019

Direction Photo Taken:

South to north

Description:

Sampling location SW07 along the concrete stormwater drain

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No. 6

Date: 5/06/2019

Direction Photo Taken:

North

Description:

Sampling location SW08 – dry (not sampled)

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No.	**Date:**
7	5/06/2019

Direction Photo Taken:

North to south

Description:

Sampling location SW08A along the drainage channel

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No.	**Date:**
8	5/06/2019

Direction Photo Taken:

South

Description:

Sampling location SW09 along a concrete stormwater drain

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Cairns Airport, Queensland	**Project No:** 60597459

Plate No. 9	**Date:** 5/06/2019

Direction Photo Taken:

North East

Description:

Sampling location SS03

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 10	**Date:** 28/03/2019

Direction Photo Taken:

-

Description:

Sediment samples collected from Barron River (SED_10)

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 11 **Date:** 28/03/2019

Direction Photo Taken:

-

Description:

Pikey Bream collected at BIO10_A

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 12 **Date:** 28/03/2019

Direction Photo Taken:

-

Description:

Mud crabs collected at BIO10_D

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 13

Date: 28/03/2019

Direction Photo Taken:

-

Description:

Oxeye Herring collected at BIO11A

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 14

Date: 28/03/2019

Direction Photo Taken:

-

Description:

Giant Leatherskin collected at BIO11_B

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 15 **Date:** 28/03/2019

Direction Photo Taken:

-

Description:

Giant Leatherskin collected at BIO12_B

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 16 **Date:** 28/03/2019

Direction Photo Taken:

-

Description:

Sicklefish collected at BIO12_D

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 17

Date: 28/03/2019

Direction Photo Taken:

-

Description:

Giant Trevally collected at BIO13_B

PHOTOGRAPHIC LOG

Site Name: Cairns Airport, Queensland	**Site Location:** Barron River	**Project No:** 60597459

Plate No. 18

Date: 28/03/2019

Direction Photo Taken:

-

Description:

Giant Trevally collected at BIO13_D

Appendix D

Bore Logs

AECOM Australia Pty Ltd
Level 8, 540 Wickham Street
Fortitude Valley, QLD 4006

BOREHOLE LOG BH01/GW08A

PROJECT NUMBER 60597459
PROJECT NAME Cairns Post-PSI Targeted Sampling
LOCATION Cairns Airport
DRILLING METHOD HFA
SAMPLING METHOD Grab
SURFACE ELEVATION 2.340 m AHD

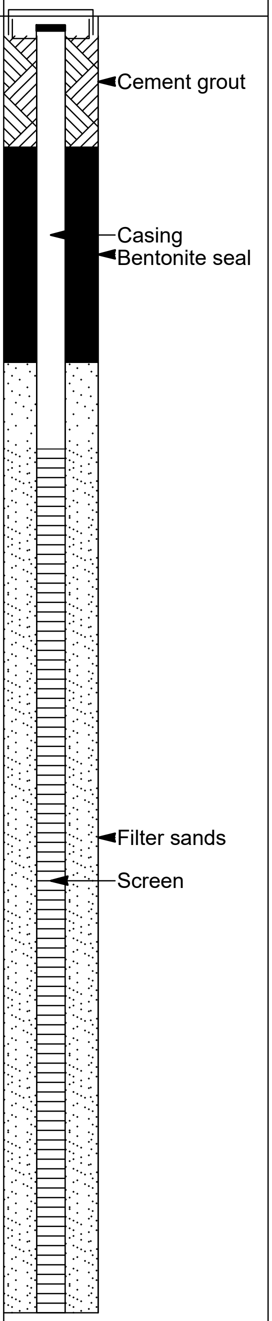
LOGGED BY C. McCosker
COMMENTS

DATE 28 May 19
BLANK 0.0-0.5
SCREEN 1.0-3.0
GRAVEL PACK 0.8-3.0
SANITARY SEAL/BENTONITE 0-0.8

NORTHING 8134859.54
EASTING 366357.59

PID (ppm)	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.0	✋	BH01_0.0-0.1				SP-SM	Fill: Silty SAND, dark brown, dry, dense, fine-medium grained, with medium-coarse angular gravels.	
0.0	✋	BH01_0.5				CL-ML	Silty CLAY, brown, dry, medium plasticity, firm, trace of sand, with coarse sub-rounded gravels and sub-rounded cobbles.	0.40
0.0	✋	BH01_1.0		1			Slightly moist @ 1.00 m bgl.	
						CLS	Sandy CLAY, brown, moist, low-medium plasticity, firm, with fine-coarse sub-rounded gravels. Wet @ 1.30 m bgl. Saturated @ 1.50 m bgl.	1.10
0.0	✋	BH01_2.0		2				
						CH	CLAY, grey, saturated, high plasticity, stiff.	2.60
0.0	✋	BH01_3.0		3			End of hole at target depth. Total Depth: 3.00 m	3.00

WELL DIAGRAM



AECOM Australia Pty Ltd
Level 8, 540 Wickham Street
Fortitude Valley, QLD 4006

BOREHOLE LOG BH02/GW09

PROJECT NUMBER 60597459
PROJECT NAME Cairns Post-PSI Targeted Sampling
LOCATION Cairns Airport
DRILLING METHOD HFA
SAMPLING METHOD Grab
SURFACE ELEVATION 2.310 m AHD

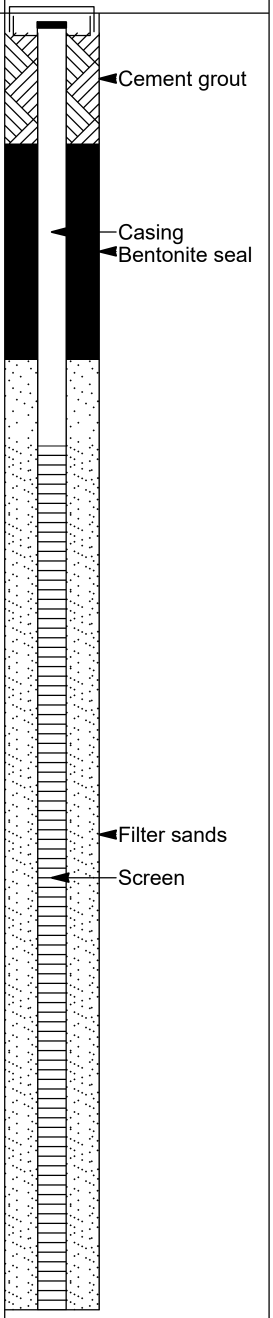
DATE 28 May 19
BLANK 0.0-0.5
SCREEN 1.0-3.0
GRAVEL PACK 0.8-3.0
SANITARY SEAL/BENTONITE 0-0.8

LOGGED BY C. McCosker
COMMENTS

NORTHING 8134356.88
EASTING 366661.66

PID (ppm)	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.6	✋	BH02_0.0-0.1			▩	SP-SM	Fill: Silty SAND, brown/grey, dry, medium dense, fine-medium grained, with coarse angular gravels and angular cobbles. 50/50 Silty Sand/angular gravels and cobbles from 0.20 m bgl.	
					▩	CL-ML	Silty CLAY, light brown, dry, no plasticity, stiff, with medium-coarse angular gravels.	0.40
0.1	✋	BH02_0.5			▩			
					⠿	SP	SAND, light grey/light brown, slightly moist, coarse grained, loose-medium dense.	0.75
0.0	✋	BH02_1.0		1	⠿			
					⠿		Light brown-brown and moist from 1.35 m bgl.	
					⠿		Grey @ 1.70 m bgl. Wet @ 1.80 m bgl.	
0.0	✋	BH02_2.0		2	⠿			
					⠿		Saturated @ 2.20 m bgl.	
					▨	SP-SC	Clayey SAND/Peat, grey/black, moist.	2.70
0.0	✋	BH02_3.0		3			End of hole at target depth. Total Depth: 3.00 m	3.00

WELL DIAGRAM



AECOM

AECOM Australia Pty Ltd
Level 8, 540 Wickham Street
Fortitude Valley, QLD 4006

BOREHOLE LOG BH03/GW10

PROJECT NUMBER 60597459
PROJECT NAME Cairns Post-PSI Targeted Sampling
LOCATION Cairns Airport
DRILLING METHOD HFA
SAMPLING METHOD Grab
SURFACE ELEVATION 2.010 m AHD

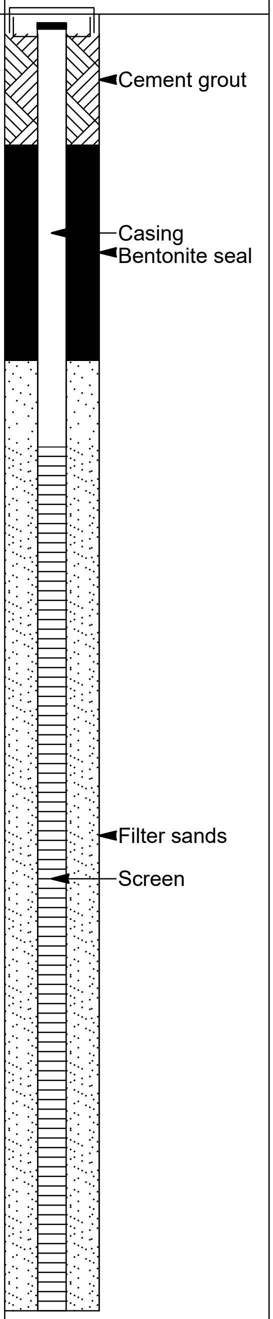
DATE 28 May 19
BLANK 0.0-0.5
SCREEN 1.0-3.0
GRAVEL PACK 0.8-3.0
SANITARY SEAL/BENTONITE 0-0.8

LOGGED BY C. McCosker
COMMENTS

NORTHING 8134577.92
EASTING 366474.01

PID (ppm)	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.0	✋	BH03_0.0-0.1				SP-SM	Fill: Silty SAND, light brown, dry, medium dense, medium grained, with medium-coarse angular gravels and angular cobbles.	
0.1	✋	BH03_0.5				SP-SM	Fill: Silty SAND, brown, dry, mediumd ense, medium grained, with fine-coarse sub-angular gravels, some angular cobbles and boulders.	0.40
0.0	✋	BH03_1.0		1		SP	SAND, light grey, slightly moist, loose, coarse grained.	0.90
							Light brown/orange, moist from 1.40 m bgl.	
							Wet @ 1.70 m bgl.	
0.0	✋	BH03_2.0		2			Saturated @ 2.00 m bgl.	
						SP-SC	Clayey SAND, grey, saturated, loose, coarse grained.	2.80
0.0	✋	BH03_3.0		3			End of hole at target depth. Total Depth: 3.00 m	3.00

WELL DIAGRAM



Appendix E

Fieldsheets and Calibration Certificates

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW01
Project Name:	ASA Carins	**Project Number:**	60597459	**PM Name:**	James Peachey	**Sample Date:**	12/6/19
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Max Setchfield	**Well Development or Well Sampling Event? (circle)**	

General Bore Information

Date of GW Level: 12/6/19
Depth to GW (m-pvc): 0.977
Bore Depth (m-pvc): 4.087
Depth to Product (m-pvc):
Product Thickness (m):
PID = 0.0
Bore Radius (mm): 50
Screen Interval (m): ?
Casing Radius (mm): ?
Cover Type ([✓ gatic]/stick up):
Bore Locked (YES/[✓ NO]):
Key Type (if applicable):

Parameter Info.

Chem Kit Serial No.: 15KL01083
Chem Kit Model: YSI PRO
Corrected Redox: Y / N
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☑ **Low Flow** Pump rate:
Intake depth: 3.0
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☒ Other (specify)

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Calculated bore volume (L):
Includes/ excludes bore annulus (circle)
purge volumes removed:
Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1322	0.25	0.978		0.18	1614.5	6.56	-218.4	27.0	Clear, slight Anaeric
1327	1.00	0.978		0.05	1599	6.43	-291.0	26.9	
1333	2.0	0.978		0.05	1706	6.45	-273.4	27.0	
1338	3.0	0.978		0.20	1745	6.44	-271.9	26.8	
1343	4.0	0.978		0.37	1772	6.45	-273.0	27.0	
1348	5.0	0.978		0.61	1774	6.46	-272.7	26.8	
1353	6.0	0.978	1	0.67	1768	6.42	-270.2	26.8	
	Sampled @ 6.0L								
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered: N/A
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	plastic				
1	sram				

QA/QC Information

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

DO not stabilised.

Approval and Distribution

Fieldwork Staff Signature
12/6/19 Date

Checker Name and Signature
Date

Project Manager Signature
Date

Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW03
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 5/6/19
Depth to GW (m-pvc): 1.307
Bore Depth (m-pvc): 3.80
Depth to Product (m-pvc): -
Product Thickness (m): -
Bore Radius (mm): 50mm
Screen Interval (m):
Casing Radius (mm):
Cover Type (gatic/stick up): gatic
Bore Locked (YES/NO): yes
Key Type (if applicable):

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☐ Downhole ☐ Retrieved

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Calculated bore volume (L):
Includes/ excludes bore annulus (circle)
purge volumes removed:
Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm~~ or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1431	250mL	1.35	6.98	0.40	44282	6.60	-90.8	26.4	Lt Brown, [illegible] Low turb, no colour/sheen
1432	500mL	1.365	6.61	0.33	42616	6.58	-92.0	26.4	cloudy, " , no sed, "
1434	1L	1.37	"	0.19	35596	6.54	-96.8	26.4	cloudy, med turb, no sed, no colour/sheen
1437	1.5L	"	"	0.36	29220	6.49	-87.9	26.2	" , " , " , "
1439	2.0	"	"	0.29	27252	6.45	-84.9	26.2	" , " , " , "
1440	2.5	"	"	0.26	25668	6.43	-85.6	26.1	Clear, Low turb, no sed, no odour/sheen
1642	3.0	"	"	0.23	24710	6.42	-85.1	26.1	" , " , " , "
1644	3.5	"	"	0.19	24000	6.41	-84.9	26.2	" , " , " , "
1646	4.0	"	"	0.18	24128	6.40	-85.9	26.2	" , " , " , "
									Sampled
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)
x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic

QA/QC Information

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Drawdown Equilibrium achieved

Approval and Distribution

5/6/19

Fieldwork Staff Signature
Date
Checker Name and Signature
Date

Project Manager Signature
Date

Distribution: Project Central File

Q4AN(EV)-405-FM1
FQM - Groundwater Sampling and Purging Record (Q4AN(EV)-405-FM1)
Revision 2 July 12, 2016

ANZ

AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW03
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 5/6/19
Depth to GW (m-pvc): 0.564
Bore Depth (m-pvc): ~3.8
Depth to Product (m-pvc): -
Product Thickness (m): -
Bore Radius (mm): 50
Screen Interval (m):
Casing Radius (mm):
Cover Type (gatic/stick up): gatic
Bore Locked (YES/NO): yes
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI PRO
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved
purge volumes removed:

Decontamination

☑ Decontaminated
☐ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)
Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1353	250mL	0.60	6.24	0.70	72633	6.55	-58.9	27.3	Cloudy, med turb, no sed load, slight O/M odour, no sheen
1354	500mL	''	''	0.22	71217	6.60	-71.9	27.4	'' , '' , '' , '' , ''
1356	1L	''	''	0.14	65631	6.59	-72.6	27.3	Clear, Low turb, '' , '' , ''
1358	1.5	''	''	0.09	63248	6.58	-69.9	27.2	'' , no turb , '' , '' , ''
1400	2L	''	''	0.08	62820	6.58	-69.7	27.3	'' , '' , '' , '' , ''
1402	2.5	''	''	0.07	62341	6.58	-69.0	27.3	'' , '' , '' , '' , ''
									Sampled
			Acceptable Parameter Range:	± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:

Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	IONS				

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Tubing removed from well
Okay recharge
Drawdown + Equilibrium achieved

Approval and Distribution

Fieldwork Staff Signature
5/6/19
Date

Checker Name and Signature
Date

Project Manager Signature
Date

Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW06
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 5/6/19
Depth to GW (m-pvc): 1.191
Bore Depth (m-pvc): 3.85
Depth to Product (m-pvc): —
Product Thickness (m): —
Bore Radius (mm): 50mm
Screen Interval (m):
Casing Radius (mm): 2
Cover Type (gatic/stick up): gatic
Bore Locked (YES/NO): yes
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved
purge volumes removed:

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)
Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm~~ or mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0821	250ml	1.260	4.21	0.78	462.8	6.53	-70.4	25.6	Clear, Low turb, no sed, no odour/sheen, trace of algae
0823	500ml	1.250	4.01	0.36	445.3	6.42	-57.5	25.7	" , " , " , " , "
0826	1L	1.255	413 80	0.22	426.5	6.37	-50.8	25.7	" , " , " , slight odour, no sheen, trace of algae
0829	1.5	"	"	0.15	419.9	6.35	-49.4	25.8	" , " , " , " , " , "
0831	2.0	"	"	0.14	418.8	6.34	-53.6	25.7	" , " , " , " , " , "
									Sampled.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	TOPS				

QA/QC Information

QC103
QC203

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Okay recharge
Drawdown + Equilibrium achieved

Tubing removed from well

Approval and Distribution

Fieldwork Staff Signature
5/6/19
Date
Checker Name and Signature
Date
Project Manager Signature
Date
Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW05
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	4/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 4/6/19
Depth to GW (m-pvc): 1.674
Bore Depth (m-pvc): 3.2
Depth to Product (m-pvc): –
Product Thickness (m): –
PID 0.0
Calculated bore volume (L):
Bore Radius (mm): 50
Screen Interval (m): ?
Casing Radius (mm): ?
Cover Type (gatic/stick up): gatic
Bore Locked (YES/NO): Y
Key Type (if applicable):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.: 19C101115
Chem Kit Model: YSI PRO
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☐ Downhole ☑ Retrieved
\# purge volumes removed:

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)
Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
13 ~~9~~36	250ml	1.78	med 683	0.50	1886	5.97	67.5	27.2	LT Brown mod turb, med sed load, no odour
1340	500ml	1.895	3.03	0.69	1885	5.97	70.1	27.1	Clear, low turb, no sed load, no odour
1244	750mL	1.95	slow 1.98	0.59	1917	6.00	66.9	26.8	" " , " , "
	~~1L~~								Reallocated bucket was leaking. ~~[illegible]~~
1350	~~[illegible]~~ 1.25L	2.01	1.87	1.69	1968	6.04	60.9	25.8	" , no turb, no sed load, no odour,
1353	1.5L	2.06	"	0.47	1931	6.00	66.3	26.1	" " , " , "
1357	1.75L	2.115	"	0.65	1974	6.00	59.3	26.1	" " , " , "
~~13~~1400	2L	2.150	"	0.36	1958	5.99	58.6	26.2	" " , " , "
									~~Grab sample~~ Purged dry, Grab sample collected
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
2	Ions				

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Slow recharge
Tubing removed from well
~~[illegible]~~
~~[illegible]~~

Approval and Distribution

Fieldwork Staff Signature — Date: 4/6/19
Project Manager Signature — Date:
Checker Name and Signature — Date:
Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

						Bore ID:	GW06
Project Name:	ASA Carins	**Project Number:**	60597459	**PM Name:**	James Peachey	**Sample Date:**	12/6/19
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Max Setchfield	**Well Development or Well Sampling Event? (circle)**	

General Bore Information

Date of GW Level:	12/6/19	Bore Radius (mm):	50
Depth to GW (m-pvc):	1.672	Screen Interval (m):	?
Bore Depth (m-pvc):	3.960	Casing Radius (mm):	?
Depth to Product (m-pvc):		Cover Type ([✓ gatic]/stick up):	
Product Thickness (m):		Bore Locked (YES/[✓ NO]):	
PID = 0.5		Key Type (if applicable):	

Parameter Info.

Chem Kit Serial No.: 15K101083

Chem Kit Model: YSI PRO.

Corrected Redox: Y / N

(The correction to apply is probe dependent)

Parameter method: ☑ Downhole ☐ Retrieved

Decontamination

☐ Decontaminated

☐ Dedicated

☐ Disposable

☐ Other (specify)

Sampling Method

☑ **Low Flow** Pump rate:

Intake depth: 2.9m

☐ Bailer ☐ Hydrasleeve

☑ Peristaltic Pump ☐ Waterra

☐ Other (specify)

Hydrasleeve info.

Hydrasleeve Size:		**Monitoring sequence followed (number in order):**
Hydrasleeve Type:		
Sampling Depth (m-pvc):		Gauging
Hydrasleeve Install time:		Hydrasleeve in
Sampling Start Time:		Hydrasleeve out
		Parameters

Calculated bore volume (L):

Includes/ excludes bore annulus (circle)

purge volumes removed:

Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or [✓ µS/cm])	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1219	0.25	1.675	High.	0.17	8272	6.47	-155.8	25.9	Clear, v. slight Anoxic
1224	1.00	1.675		0.06	8644	6.26	-173.5	26.1	
1229	2.80	1.675		0.05	8664	6.21	-190.6	26.0	
1234	3.00	1.675		0.03	8731	6.18	-189.1	26.2	
1239	4.00	1.675		0.03	8753	6.16	-195.0	26.2	
1244	5.00	1.676		0.04	8738	6.16	-196.9	26.1	
Sampled									
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered: ~~X~~ N/A

Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	125ml plastic				
1	green				

QA/QC Information

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Approval and Distribution

Fieldwork Staff Signature

Date 12/6/19

Checker Name and Signature

Date

Project Manager Signature

Date

Distribution: Project Central File

AECOM

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW07
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level:	5/6/19	Bore Radius (mm):	50mm
Depth to GW (m-pvc):	1.163	Screen Interval (m):	
Bore Depth (m-pvc):	6.4m	Casing Radius (mm):	
Depth to Product (m-pvc):	N/A	Cover Type (gatic/stick up):	gatic
Product Thickness (m):	N/A	Bore Locked (YES/NO):	yes
PID 0.0		Key Type (if applicable):	

Parameter Info.

Chem Kit Serial No.:

Chem Kit Model: YSI Pro

Corrected Redox: Y / [✓ N]

(The correction to apply is probe dependent)

Parameter method: ☐ Downhole ☐ Retrieved

Decontamination

- ☑ Decontaminated
- ☐ Dedicated
- ☐ Disposable
- ☐ Other (specify)

Sampling Method

- ☐ **Low Flow** Pump rate:
  - Intake depth:
- ☐ Bailer ☐ Hydrasleeve
- ☑ Peristaltic Pump ☐ Waterra
- ☐ Other (specify)

Hydrasleeve info.

Hydrasleeve Size:	
Hydrasleeve Type:	
Sampling Depth (m-pvc):	
Hydrasleeve Install time:	
Sampling Start Time:	

Monitoring sequence followed (number in order):

- Gauging
- Hydrasleeve in
- Hydrasleeve out
- Parameters

Calculated bore volume (L):

Includes/ excludes bore annulus (circle)

purge volumes removed:

Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1611	250ml	1.270	3.32	0.47	60826	6.83	-107.0	27.5	clear, no turb, no sed load, slight organic colour, no sheen
1613	500ml	1.280	2.69	0.29	61693	6.82	-102.8	27.3	" , " , " , " , "
1616	~1.5	1.53	3.50	0.08	63572	6.81	-114.8	28.8	No Recharge, increased speed to purge, no sed pulled and,
									dropped back to slow pump rate
1619	1.75	1.57	2.16	0.07	61033	6.81	-124.7	26.3	clear, no turb, no sed, slight org colour, no sheen
1623	2.00	1.65	1.96	0.09	59208	6.78	-131.8	25.4	" , " , " , " , "
1628	2.25	1.73	1.26	0.09	58113	6.76	-135.6	25.3	" , " , " , " , "
1633	2.5	1.77	1.26	0.08	57793	6.74	-139.8	25.3	" , " , " , " , "
									Stabilised. Grab sample collected.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:

Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	TOPA				

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Tubing Removed from well
↳ Black staining ~ 1.5–2.5m
→ Nothing on IP
– Organic odour → Algae growth??

V-Slow Recharge, V-close to creek, well might be stuffed.

Approval and Distribution

Fieldwork Staff Signature — Date: 5/6/19

Checker Name and Signature — Date

Project Manager Signature — Date

Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW08A
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 5/6/19
Depth to GW (m-pvc): 1.003
Bore Depth (m-pvc): 3m
Depth to Product (m-pvc): –
Product Thickness (m): –
Bore Radius (mm): 50mm
Screen Interval (m): 1-3
Casing Radius (mm): ~~[illegible]~~ 50-1
Cover Type (gatic/stick up): gatic
Bore Locked (YES/NO): Y
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved
purge volumes removed:

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)
Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0719	250mL	1.065	6.16	0.82	8332	6.46	-10.6	24.8	clear, no turb, no sed load, no odour/sheen
0720	500mL	1.055	5.43	0.63	8297	6.47	-18.3	25.7	'' , '' , '' , ''
0722	1L	1.06	''	0.52	8146	6.47	-20.5	25.7	'' , '' , '' , ''
0724	1.5	1.07	4.86	0.35	7772	6.46	-15.6	25.4	'' , '' , '' , ''
0728	2L	1.075	4.01	0.27	7582	6.46	-16.7	25.3	'' , '' , '' , slight OM odour, no sheen
0731	2.5L	''	''	0.25	7479	6.45	-18.9	25.4	'' , '' , '' , '' , ''
									Sampled.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	Ions				

QA/QC Information

QC102
QC202

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Okay Recharge
Drawdown + Equilibrium achieved

Approval and Distribution

Fieldwork Staff Signature
Date: 5/6/19
Checker Name and Signature
Date
Project Manager Signature
Date
Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW09
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	4/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 4/6/19
Depth to GW (m-pvc): 2.364
Bore Depth (m-pvc): 3m
Depth to Product (m-pvc): –
Product Thickness (m): –
PID:
Bore Radius (mm): 50
Screen Interval (m): 1-3
Casing Radius (mm): 0-1
Cover Type (gatic/stick up): gatic
Bore Locked (YES/NO): Y
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved

purge volumes removed:

Decontamination

☑ Decontaminated
☐ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)

Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Problem with pump *

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1540	250ml	2.39	583	25.6	117.5	6.55	93.8	25.6	Clear, Low turb, no sed load, no odour/sheen
1541	500ml	2.40	"	1.39	114.0	6.35	117.7	25.6	", ", ", "
1543	1L	2.40	"	1.34	94.6	5.98	151.7	25.7	", no turb, ", "
1547	1.5L	"	"	1.51	94.9	5.68	183.7	25.6	", ", ", "
1549	2L	"	"	1.22	91.8	5.62	195.5	25.7	", ", ", "
1551	2.5L	"	"	1.22	92.0	5.60	202.9	25.7	", ", ", "
1553	3L	"	"	1.26	92.0	5.58	204.6	25.7	", ", ", "
									Sampled
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:

Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	Ions				

QA/QC Information

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Good Recharge

Drawdown + Equilibrium achieved,

Approval and Distribution

CMcC
Fieldwork Staff Signature

4/6/19
Date

Checker Name and Signature

Date

Project Manager Signature

Date

Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	GW10
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	4/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 4/6/19
Depth to GW (m-pvc): 1.789
Bore Depth (m-pvc): 3
Depth to Product (m-pvc): –
Product Thickness (m): –
Bore Radius (mm): 50
Screen Interval (m): 1–3
Casing Radius (mm): 8–1
Cover Type (gatic/stick up):
Bore Locked (YES/NO):
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved
purge volumes removed:

Decontamination

☑ Decontaminated
☐ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)
Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1618	250ml	1.80	7.77	2.40	1903	6.13	122.6	25.8	Clear, no turb, no sed load, no colour/sheen
1119	500ml	"	"	2.20	1743	6.21	111.9	26.0	" " " "
1620	1L	"	"	2.21	1305	6.17	98.6	26.1	", ", ", "
1622	1.5L	"	"	1.98	864	6.15	93.9	26.1	", ", ", "
1624	2L	"	"	1.97	557	6.12	95.5	26.1	", ", ", "
1625	2.5	"	"	1.91	401.8	6.10	97.5	26.1	", ", ", "
1627	3.0	"	"	1.81	315.8	6.08	105.6	26.1	", ", ", "
1628	3.5	"	"	1.79	246.7	6.00	108.1	26.0	", ", ", "
1630	4.0	"	"	1.65	234.8	5.96	113.0	26.0	", ", ", "
1632	4.5	"	"	1.71	223.6	5.95	115.8	26.0	", ", ", "
									Sampled
		Acceptable Parameter Range:		± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	IONS				

QA/QC Information

Field Comments

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Good Recharge

Drawdown eq achieved.

Approval and Distribution

Fieldwork Staff Signature   4/6/19 Date

Checker Name and Signature   Date

Project Manager Signature   Date

Distribution: Project Central File

ANZ

AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	CAC1
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 5/6/19
Depth to GW (m-pvc): 1.817
Bore Depth (m-pvc): ~4.5
Depth to Product (m-pvc): –
Product Thickness (m): –
PID: 0.0
Calculated bore volume (L):
Bore Radius (mm): 50
Screen Interval (m):
Casing Radius (mm): 50mm
Cover Type (gatic/stick up): Monument
Bore Locked (YES/NO): no
Key Type (if applicable):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved
\# purge volumes removed:

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

Sampling Method

☐ Low Flow Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)
Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	→978.2 pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1218	250mL	1.90	6.90	1.96	129.2	5.79	108.3	25.6	clear, med turb, no sed load, no odour/sheen
1219	500mL	~~[illegible]~~ ''	7.06	2.06	106.0	5.69	121.9	26.6	'' , Low turb, '' , ''
1220	1L	''	''	2.01	~~[illegible]~~	5.64	128.8	26.7	'' , '' , '' , ''
1222	1.5	''	''	1.88	96.3	5.63	134.8	26.7	'' , '' , '' , ''
1224	2L	''	''	1.83	95.4	5.62	136.8	26.7	'' , '' , '' , ''
1226	2.5L	''	''	1.85	94.9	5.60	138.5	26.8	'' , '' , '' , ''
									Sampled
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	TOC				

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Good Recharge
Drawdown + Equilibrium achieved.

Tubing removed from well!

Approval and Distribution

Fieldwork Staff Signature — Date: 5/6/19
Checker Name and Signature — Date
Project Manager Signature — Date
Distribution: Project Central File

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	CA03
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level: 5/6/19
Depth to GW (m-pvc): 0.897
Bore Depth (m-pvc): 6m
Depth to Product (m-pvc): -
Product Thickness (m): -
PID: 0.0
Bore Radius (mm):
Screen Interval (m):
Casing Radius (mm):
Cover Type (gatic/stick up): stick
Bore Locked (YES/NO): no
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: YSI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☑ Downhole ☐ Retrieved

Decontamination

☑ Decontaminated
☑ Dedicated
☐ Disposable
☐ Other (specify)

purge volumes removed:

Sampling Method

☐ **Low Flow** Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☑ Peristaltic Pump ☐ Waterra
☐ Other (specify)

Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1137	250ml	0.92	6.54	1.58	5633	7.45	-77.1	26.4	Clear, no turb, no sed load, slight [illegible] odour, no sheen, Trace of algae
1138	500ml	"	"	0.52	5828	7.70	-135.1	26.7	", ", ", ", ", "
1140	1L	"	7.08	0.32	6129	7.76	-161.8	27.1	", ", ", ", ", "
1141	1.5L	"	"	0.26	6124	7.73	-162.1	27.2	Clear, med turb, ", ", ", Lots of Brown algae
1143	2L	"	"	0.23	6023	7.65	-156.7	27.2	", ", ", ", ", "
1145	2.5	"	"	0.13	5103	7.54	-146.3	27.3	", no turb, ", ", ", trace of algae
1146	3.0	"	"	0.15	4360	7.19	-110.9	27.4	", ", ", ", ", "
1147	3.5	"	"	0.6	3011	6.77	-57.2	27.5	", ", ", ", ", "
1149	4.0	"	"	0.20	2019	6.88	20.19	27.5	CHecked DP Probe, ", "
1154	4.5	"	"	0.53	1372	6.11	36.8	27.4	", ", ", ", ", no algae
1155	5.0	"	"	0.42	1335	6.08	37.4	27.4	", ", ", ", ", "
1156	5.5	"	"	0.41	1333	6.09	35.7	27.3	", ", ", ", ", "
									Sampled
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	EONS				

QA/QC Information

QC106
QC206

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Covered with pole cap. well not locked, monument core broken

Good Recharge

Drawdown + Equilibrium achieved

Tubing removed from well

Approval and Distribution

Fieldwork Staff Signature
5/6/19
Date
Checker Name and Signature
Date
Project Manager Signature
Date
Distribution: Project Central File

AECOM

ANZ

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	CA08
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	
						Well Development or Well Sampling Event? (circle)	

General Bore Information

Date of GW Level:	5/6/19	Bore Radius (mm):	50mm
Depth to GW (m-pvc):	2.293	Screen Interval (m):	?
Bore Depth (m-pvc):	4.2	Casing Radius (mm):	?
Depth to Product (m-pvc):	–	Cover Type (gatic/stick up):	mon
Product Thickness (m):	–	Bore Locked (YES/NO):	NO
PID: 0.0		Key Type (if applicable):	

Parameter Info.

Chem Kit Serial No.:

Chem Kit Model: YSI Pro

Corrected Redox: Y / [✓ N]

(The correction to apply is probe dependent)

Parameter method: ☑ Downhole ☐ Retrieved

Decontamination

☑ Decontaminated

☑ Dedicated

☐ Disposable

☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:

Intake depth:

☐ Bailer ☐ Hydrasleeve

☑ Peristaltic Pump ☐ Waterra

☐ Other (specify)

Hydrasleeve info.

Hydrasleeve Size:

Hydrasleeve Type:

Sampling Depth (m-pvc):

Hydrasleeve Install time:

Sampling Start Time:

Monitoring sequence followed (number in order):

Gauging

Hydrasleeve in

Hydrasleeve out

Parameters

Calculated bore volume (L):

Includes/ excludes bore annulus (circle)

purge volumes removed:

Total purged volume (L):

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1317	250mL	2.32	7.05	0.63	108.8	5.78	99.4	26.6	Lt Brown, med turb, low sed load, no odour/sheen
1318	500mL	''	''	0.32	97.4	5.77	97.0	26.6	Clear-Lt Brown, med turb, no sed, no odour/sheen
1319	1L	''	''	0.18	109.6	5.75	96.7	26.6	cloudy, med turb, no sed, no odour/sheen
1321	1.5	''	''	0.16	109.4	5.75	101.6	26.6	'' , '' , '' , ''
1323	2	''	''	0.13	109.5	5.77	100.9	26.6	'' , '' , '' , ''
									Sampled
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:	Unfiltered:

Bottles Collected

	x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)
	x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic
1	PFAS				
1	TOPA				

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Drawdown/equilibrium achieved

Approval and Distribution

Fieldwork Staff Signature	5/6/19 Date	Checker Name and Signature	Date
Project Manager Signature	Date	**Distribution:** Project Central File	

ANZ

AECOM

FQM - Groundwater Sampling and Purging Record

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	MW05
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	5/6/19

Well Development or Well Sampling Event? (circle)

General Bore Information

Date of GW Level:	5/6/19	Bore Radius (mm):	50
Depth to GW (m-pvc):	1.502	Screen Interval (m):	
Bore Depth (m-pvc):	4.7	Casing Radius (mm):	
Depth to Product (m-pvc):	—	Cover Type (gatic/stick up):	gatic
Product Thickness (m):	—	Bore Locked (YES/NO):	no
PID: 0.0		Key Type (if applicable):	
Calculated bore volume (L):		Includes/ excludes bore annulus (circle)	

Parameter Info.

Chem Kit Serial No.:

Chem Kit Model: YSI Pro

Corrected Redox: Y / [✓ N]

(The correction to apply is probe dependent)

Parameter method: ☑ Downhole ☐ Retrieved

purge volumes removed:

Decontamination

☑ Decontaminated

☐ Dedicated

☐ Disposable

☐ Other (specify)

Sampling Method

☐ **Low Flow** Pump rate:

Intake depth:

☐ Bailer ☐ Hydrasleeve

☑ Peristaltic Pump ☐ Waterra

☐ Other (specify)

Total purged volume (L):

Hydrasleeve info.

Hydrasleeve Size:

Hydrasleeve Type:

Sampling Depth (m-pvc):

Hydrasleeve Install time:

Sampling Start Time:

Monitoring sequence followed (number in order):

Gauging

Hydrasleeve in

Hydrasleeve out

Parameters

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
1247	~~1.505~~ 250ml	1.505	7.06	0.84	106.7	5.68	143.6	27.3	Clear, Low turb, no sed load, no odour/sheen
1248	500ml	"	"	0.48	107.4	5.66	150.7	27.6	", ", ", "
1250	1L	"	"	0.37	107.9	5.66	158.0	27.8	", ", ", "
1251	1.5	"	"	0.28	107.6	5.67	159.7	27.6	", ", ", "
1253	2L	"	"	0.23	107.5	5.66	161.1	27.7	", ", ", "
									Sampled
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:

Unfiltered:

Bottles Collected

x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)
x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic
1 PFAS		
1 Org		

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Well head damaged. Old well ?? rusty Casing

Drawdown + Equilibrium achieved

Good Recharge

Sheen in well head - ~~[illegible]~~ - Unwunder By aitwen

Approval and Distribution

Fieldwork Staff Signature 5/6/19 **Date**

Checker Name and Signature **Date**

Project Manager Signature **Date**

Distribution: Project Central File

ANZ

FQM - Sediment Sampling Record

AECOM

Q4AN(EV)-301-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey
Client:	ASA	**Project Location**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker

Sample Date: 4/6/19

Page 1 of 1

General Information

Sample Method:	grab	**Weather Conditions AM:**	
Geo Ref. Sys.:		**Weather Conditions PM:**	
Comments:			

Tide Information

Tide	Time	Height	Time	Height
High Tide				
Low Tide				

Sampling Information

Sample Location	Time	Latitude	Longitude	Sample ID	PID ~~Water Depth~~	Sample depth (m bgl)	Type, colour/mottling, plasticity/particle size, secondary/minor components	Biota	Shell Presence	Organic Content	Odour	Other Comments (e.g. foreign material, veneers, strata, biota)
SS03	1500											
SS04	1650				0-0	Surface	Br, Silty Clay, med, soft, Dry	–				
SS07	0915				0-0	"	Br " , " , " , wet	mangrove	–	–	Slight on	From Concrete bank
SS08	0930				0·0	"	Br, Silty Clay loam,	–	–	–	–	Crete channel – mud
SS09	1010				0-0	"	Br , "	red flag	–	–	–	above concrete channel
					0-0	"	OM Clay, Dr/Black, wet, Interbedded		–	–	–	"
SS06	1050						grass stems/reeds.					near bridge
SS08A	1105				0-0	"	Clay, Br, med plas, soft					
~~[illegible]~~					0-0	"	gravelly Clay, Dr R+ Brown,	grass cover	–	–	–	–
							med plas, soft, angular	gravel cover	–	–	–	–
							gravel,,					
SS05	1501											
					0-0	"	OM Clay, non-low plasticity, v soft,	grass/mulch	–	–	–	Slime @ bottom
SS01	1535						Structured					of concrete
					0-0	"	Silty Clay, Br, med plas, soft	mangove	–	–	–	drain
SS02	1551											
					0-0	"	Silty Clay, Br, med plas, soft	Crete Bank		–	–	
							marine					

Approval and Distribution

Fieldwork Staff Signature

Date 4/6/19

Project Manager Signature

Date

Distribution: Project Central File

Q4AN(EV)-301-FM1
FQM - Sediment Sampling Record (Q4AN(EV)-301-FM1)
Revision 1 May 2, 2016

ANZ **AECOM**

SW Sample record
~~FQM - Groundwater Sampling and Purging Record~~

Q4AN(EV)-405-FM1

Project Name:	Post-PSI Targeted Sampling	**Project Number:**	60597459	**PM Name:**	James Peachey	**Bore ID:**	
Client:	ASA	**Project Location:**	Cairns Airport	**Fieldwork Staff:**	Camden McCosker	**Sample Date:**	
						Well Development or Well Sampling Event? (circle)	

General Bore Information

Date of GW Level:
Depth to GW (m-pvc):
Bore Depth (m-pvc):
Depth to Product (m-pvc):
Product Thickness (m):
Bore Radius (mm):
Screen Interval (m):
Casing Radius (mm):
Cover Type (gatic/stick up):
Bore Locked (YES/NO):
Key Type (if applicable):
Calculated bore volume (L):
Includes/ excludes bore annulus (circle)

Parameter Info.

Chem Kit Serial No.:
Chem Kit Model: WI Pro
Corrected Redox: Y / [✓ N]
(The correction to apply is probe dependent)
Parameter method: ☐ Downhole ☐ Retrieved

Decontamination

☐ Decontaminated
☐ Dedicated
☐ Disposable
☒ Other (specify)

Sampling Method

☐ Low Flow Pump rate:
Intake depth:
☐ Bailer ☐ Hydrasleeve
☐ Peristaltic Pump ☐ Waterra
☐ Other (specify)

Hydrasleeve Info.

Hydrasleeve Size:
Hydrasleeve Type:
Sampling Depth (m-pvc):
Hydrasleeve Install time:
Sampling Start Time:

Monitoring sequence followed (number in order):
Gauging
Hydrasleeve in
Hydrasleeve out
Parameters

purge volumes removed:
Total purged volume (L):

Water Quality Parameters

Time	Sample ID ~~Cumulative Vol. Removed (L)~~	SWL (m-pvc)	Pump Rate	DO (~~ppm or~~ mg/L)	E.C. (~~mS/cm or~~ µS/cm)	pH	Redox (mV)	Temp °C	→23.2 Odour, Colour, Turbidity
1500	SW03	5cm		3.89	26671	7.12	-24.2	26.3	LT brown, ~~med turb~~ low sed load, no odour/sheen
1650	SW04	w1m		4.06	32896	7.34	56.9	~~[illegible]~~	Brown, high turb, low sed load, slight an odour, no sheen
0915	SW07	w1cm		7.87	37455	8.03	158.2	24.2	clear, low turb, no sed, no odour, sheen, possibly
"	"	"	"	"	"	"	"	"	organic, Algae within water, stagnant
0920	SW08	–	–	–	–	–	–	–	Dry
1015	SW09	w10cm	–	7.78	2478	8.06	2693.5	19.6	Clear, no turb, no-low sed, no odour/sheen, Flowing
1055 ~~[illegible]~~	SW06	w10cm	–	10.51	2534	8.51	111.3	21.1	" , " , " , no odour/sheen, "
1110	SW08A	w1m	–	5.58	1464	7.03	109.8	26.0	LT Brown, med turb, no sed, severe odour, no sheen, Flowing
1458	SW05	w3cm	–	8.38	2625	8.31	-60.7	20.6	~~[illegible]~~ clear, low turb, high sed load, no odour, no sheen, tadpoles
1535	SW01	w30cm	–	5.65	43396	7.72	92.3	19.2	~~[illegible]~~ Brown, med turb, med sed, no odour/sheen, In mangroves
1550	SW02	w1-2m	–	8.65	26694	7.69	88.8	19.7	Brown, High turb, med sed, no odour/sheen, creek
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:

Field Filtered:
Unfiltered:

Bottles Collected

x 40 mL Vial (HCl)	x 60 mL Ferrous	x 60 mL metals (HNO_3)
x 40 mL Vial (H_2SO_4)	x 100 mL Amber	x 250 mL Plastic

QA/QC Information

Field Commets

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

*SW09/SS09 on East side of road. 3x Ambers
*SW08 = Dry
*SW08A/SS08A → near comms tower, west side of road ?

Approval and Distribution

Fieldwork Staff Signature
Date 4-5/6/19

Checker Name and Signature
Date

Project Manager Signature
Date

Distribution: Project Central File

Fish Community Data

BLUE EARTH
ENVIRONMENTAL

Sample Details

Site name / code:	SW10	Volts:	
Waterway:	Barron Rv.	Frequency:	
Date:	27/03/2019	Duty cycle:	
Personnel:	SK + CP	Conductivity:	

Pony fish → Leiognathus equulus
thread fin silverbiddy
Gerres filamentosus

5 - Line - 09:30/10:30
6 - Gill - 15:50 → 16:50
No catch

Survey Effort

Clock time	Unit	Pass	Unit	Pass	Unit	Pass	Unit	Pass
	1	Gill	2	POTS	3	Gill	4	Gill
Start	11:00		11:00		17:00		07:30	
Finish	12:30		17:00		18:00		10:30	
Total		mins		mins		mins		mins
Power-on time								
Total		secs		secs		secs		secs

Fish Catch Data

7 - Pots - 18:00 → 07:30

Unit	Gear BP/SN	Species	Retained		Counts															
			Y	No.	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	Total
1	Gill	PomArg			1															1
		GerFil			1															1
2	POTS	Mudcrab	✓	2	m	M	J													3
3	Gill	Mudcrab			J															1
		DrePun			1															1
		LeiEqu			1															1
4	Gill	Pikey	✓		1															1
		Spotted Scat			11															2
		LeiEqu			1															1
5	Line	PomArg			1															1
		AcaAus			1															1
6	Gill	NoCatch																		—
7	POTS	MudCrab	✓	11	m	m	m	m	F											5
					(combined sample / composite).															

PomArg = Pomadarys argenteus - Javelin Fish
Spotted sicklefish → Drepane punctata

Fish Community Data

Sample Details

Site name / code:	SW11	Volts:	
Waterway:	Barron Rv	Frequency:	
Date:	28 / 03 / 2019	Duty cycle:	
Personnel:	SK + CP	Conductivity:	

Survey Effort

Clock time	Unit	Pass	Unit	Pass	Unit	Pass	Unit	Pass
	1	POTS	2	Gill	3	LINE		
Start	17:30		11:00		11:00		__:__	
Finish	06:45		12:30		12:30		__:__	
Total	mins		mins		mins		mins	
Power-on time								
Total	secs		secs		secs		secs	

Fish Catch Data

Unit	Gear *BP/SN*	Species	Retained		Counts															
			Y	No.	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	Total
1	POTS	Mudcrab	✓	1	M	F	J	J												4
2	Gill	Oxeye Herring	✓	1	1															1
		ScoCom	✓	2	3															3
3	Line	No catch																		—

Fish Community Data

BLUE EARTH
ENVIRONMENTAL

Sample Details

Site name / code:	SW12	Volts:	
Waterway:	Barron River	Frequency:	
Date:	28 / 03 / 2019	Duty cycle:	
Personnel:	CP + SK	Conductivity:	

Survey Effort

Clock time	Unit	Pass	Unit	Pass	Unit	Pass	Unit	Pass
	1	Pots	2	Gill	3	LINE		
Start	08 : 00		13 : 30		13 : 30		__ : __	
Finish	15 : 30		15 : 30		15 : 30		__ : __	
Total	mins		mins		mins		mins	
Power-on time								
Total	secs		secs		secs		secs	

Fish Catch Data

Unit	Gear BP/SN	Species	Retained		Counts															
			Y	No.	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	Total
1	POTS	NoCatch																		—

2	Gill	PomArg			|															1
		GT	Y	11	|||															3
		ScoCom	Y	1	|															1
		DrePun	Y	1	|															1

3	Line	AcaAus	Y	11	||															2
		PomArg			|															1

Fish Community Data

BLUE EARTH ENVIRONMENTAL

Sample Details

Site name / code: SW13	Volts:
Waterway: Barron River	Frequency:
Date: 27/03/2019	Duty cycle:
Personnel: SK + CP	Conductivity:

Giant trevally. Caranx ignoblilis

Survey Effort

Clock time	Unit	Pass	Unit	Pass	Unit	Pass	Unit	Pass
	1	Gill	2	LINE				
Start	12:50		13:00		__:__		__:__	
Finish	14:45		14:00		__:__		__:__	
Total	mins		mins		mins		mins	
Power-on time								
Total	secs		secs		secs		secs	

Fish Catch Data

Unit	Gear BP/SN	Species	Retained		Counts															
			Y	No.	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	Total
1	Gill	DrePun			I															1
		ScoCom	✓	I	II															2
		GT	✓	II	II															2
2	Line	GT	✓	I	I															1

Giant Leatherskin Scomberoides commersonianus

Site code	Date / Time	Species	Sample code	Tissue sample weight	Total length	Total weight
SW13	27/03/19 14:30	Giant travally	BIO13_A	53g	328 mm	470 g
SW13	27/03/19 14:30	Giant leatherskin	BIO13_B	71g	412 mm	433g.
SW13	27/03/19 14:30	Giant travally	BIO 13_C	53g	362 mm	555g
SW13	27/03/19 14:30	Giant travally	BIO 13_D	72g	414mm	802g
SW11	28/03/19 12:30	Oxeye Herring	BIO 11_A	144	568mm	16.80g
SW11	28/03/19 12:30	Giant leathorskin	BIO11_B	59	476 mm	676g.
SW11	28/03/19 12:30	Giant Leathmerskin	BIO 11_C	62	392 mm	379g
SW11	28/03/19 12:30	Mud Crab	BIO 11_D	51g	14cm Carapace width	364g

Site code	Date / Time	Species	Sample code	Tissue sample weight	Total length	Total weight
SW10	28/03/19 10:30	Pikey Bream	BI010_A	70g	327 mm	658 g
SW12	28/03/19 15:30	Giant trevally	BI012_A	74g	412 mm.	808 g
SW12	28/03/19 15:30	Giant leatherskin	BI012_B	50g	381 mm	318g
SW12	28/03/19 15:30	Bream (Yellow fin)	BI012_C	45g	283 mm	455g
SW12	28/03/19 15:30	Sicklefish	BI012_D	51g	355mm	1156g.
SW12	28/03/19 15:30	Giant Travelly	BI012_E	56g	390 mm	660g
SW10	27/03/19 17:00	Mud Crab	BI010_B	66g	170 mm carapace width	812g
SW10	27/03/19 17:00	Mud Crab	BI010_C	63g	150mm carapace width	687g
SW10	29/03/19 08:00	Mud Crab	BI010_D	21g.	100 mm 105 mm Carapace width	143g 174g

Water Quality Data

us/cm / 1000 = ms/cm

Flooding Tide.

Site	Date	Time	Depth	Temperature	Conductivity	pH	DO (% sat)	DO (mg/L)	Turbidity
SW13	27/3/19	15:00	S	28.3	1680 us/cm	6.7	105.5	8.2	22.5
			1m	28.0	15.0 ms/cm	7.2	111.3	8.3	16.8
			(BED) 2m	31.0	44.3 ms/cm	7.9	113.0	8.4	~~[illegible]~~ 12.8
SW12	27/3/19	15:30	S	28.4	516 us/cm	7.0	118.0	9.0	23.4
			1	26.3	2140 us/cm	6.8	125.0	10.1	24.1
			2	28.5	27.9 ms/cm	7.2	101.1	7.0	12.3
			3 (BED)	30.2	44.8 us/cm	7.6	83.2	5.4	12.8
SW11	27/3/19	16:30	S	28.3	483 us/cm	7.0	106.3	8.3	27.4
			1	26.5	1100 us/cm	6.9	112.8	9.0	28.7
			2 (BED)	29.1	30.6 ms/cm	7.8	112.3	9.0	22.8
SW10	28/3/19	16:00	S	29.8	409 us/cm	6.9	110.9	8.7	20.3
			1	27.3	601 us/cm	6.8	109.6	8.6	20.1
			2	27.6	970 us/cm	6.8	122.6	9.7	22.3
			3 BED	28.7	34.0 ms/cm	7.1	77.9	5.4	11.2
			=35						

Ebbing tide

Site	Date	Time	Depth	Temperature	Conductivity	pH	DO (% sat)	DO (mg/L)	Turbidity
* SW13	29/3/19	06:30	S	27.6	8.0 ms/cm	7.8	83.0	6.4	15.2
			1	30.3	30.0 ms/cm	7.5	76.2	5.3	15.0
			2 2.5 BED	30.2	31.2 ms/cm	7.5	75.2	5.1	14.1
SW12	29/3/19	06:50	S	27.0	4.4 ms/cm	6.7	67.2	5.3	29.6
			1	27.2	5.8 ms/cm	6.7	70.3	5.4	39.9
			2	27.3	7.3 ms/cm	6.7	81.6	6.3	37.1
			3 BED 3.5	28.0	10.6 ms/cm	6.8	80.8	6.1	30.5
SW11	29/3/19	07:10	S	26.7	2.6 ms/cm	6.8	87.0	7.0	24.9
			1	27.0	4.0 ms/cm	6.7	86.5	6.8	22.0
			2 BED 2.5	26.7	5.0 ms/cm	6.7	90.3	7.1	34.3
# SW10	29/3/19	07:30	S	26.2	150 us/cm	7.0	95.7	7.7	35.1
			1	26.3	155 us/cm	6.9	95.4	7.7	40.0
			2 BED 2.5	26.3	165 us/cm	6.9	96.0	7.8	38.2

* Several live aboard yacht's
in vicinity

\# QC102 + QC201 parent
Sample is SW10 – E

1

SW13 - 16·86284 / 145 76125
SW12 -16·86818 / 145·75285

Site code	Date / Time	Photo No.	Estimated sediment grain size	Odour and colour	Comments
SW13	27/03/19 14:30		100% fines/clays, silts.	No odour. Dark grey	Minor (<1%) leaf litter. No seagrass or other material
SW12	27/03/19. 15:30		100% fines/clays, silts	No odour Dark grey	Minor (<1%) leaf litter No seagrass, or other material
SW11	27/03/19 16:30		~~90~~ 80% fines/clays, silts 20% fine sands	No odour Brown - grey	5% leaf litter. No seagrass or other material
SW10	28/03/19 08:45		100% fines ~~[illegible]~~ Clays/silts.	Grey / Black	No leaf litter or other material Parent sample
					QC100 + Duplicate QC200 triplicate QC101 PW Duplicate

SW11 -16·86597 / 145·74701
SW10 -16.86282 / 145·74118

1

SW13 - 16·86284 / 145 76125
SW12 -16·86818 / 145·75285

Site code	Date / Time	Photo No.	Estimated sediment grain size	Odour and colour	Comments
SW13	27/03/19 14:30		100% fines/clays, silts.	No odour. Dark grey	Minor (<1%) leaf litter. No seagrass or other material
SW12	27/03/19. 15:30		100% fines/clays, silts	No odour Dark grey	Minor (<1%) leaf litter No seagrass or other material
SW11	27/03/19 16:30		~~90~~ 80% fines/clays, silts 20% fine sands	No odour Brown - grey	5% leaf litter. No seagrass or other material
SW10	28/03/19 08:45		100% fines [illegible] Clays/silts.	Grey / Black	No leaf litter or other material Parent sample
					QC100 + Duplicate QC200 triplicate QC101 PW Duplicate

SWII -16·86597 / 145·74701
SW10 -16.86282 / 145·74118

Oil / Water Interface Meter

Instrument Geotech Interface Meter (30m)
Serial No. 4027

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.52v
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: Ben Pearson

Calibration date: **21-May-19**

Next calibration due: **20-Jul-19**

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-113997

airmet

Air-Met Scientific Pty Ltd
1300 137 067

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

Low	High	TWA	STEL
50ppm	100ppm		

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		100ppm Isobutylene	NIST	BR74		100ppm

Calibrated by: Braeden Curtis

Calibration date: 23/05/2019

Next calibration due: 19/11/2019

Gas Calibration Certificate

Instrument MX4
Serial No. 13060A5-014
Sensors CO, H2S, O2, LEL

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	Oxygen	✓	
	Pentane	✓	
	CO	✓	
	H2S	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version		
Datalogger	Operation		
Download	Operation		
Other tests:			

Low	High	TWA	STEL
19.50%	23.50%	N/A	N/A
5% LEL	10% LEL	N/A	N/A
30ppm	60ppm	30ppm	60pmm
10ppm	15ppm	10ppm	15ppm

Certificate of Calibration

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

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		Fresh Air		Fresh Air	20.90%
LEL		25% LEL Methane	NIST	BR103	25% LEL
CO		100ppm	NIST	BR103	100ppm
H2S		22ppm	NIST	BR103	22 ppm

Calibrated by: **Braeden Curtis**

Calibration date: **23/05/2019**

Next calibration due: **22/11/2019**

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 11K100623

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 7.00		pH 7.00	**NIST**	320613	pH 7.00
2. pH 4.00		pH 4.00	**NIST**	320612	pH 4.00
3. mV		240mV	**NIST**	325420/325421	240mV
4. EC		2.76mS	**NIST**	322349	2.76mS
6. D.O		0 ppm	**NIST**	5928	0 ppm
7. Temp		24.oC	**NIST**	MultiTherm 09000528	24.oC

Calibration by: Russon Cooke

Calibration date: 23/05/2019

Next calibration due: 19/11/2019

3/6/19

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Oil / Water Interface Meter

Instrument **Interface Meter (60M)**
Serial No. **312450**

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
	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: **Braeden Curtis**

Calibration date: **3/06/2019**

Next calibration due: **2/08/2019**

Multi Parameter Water Meter

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 19C101115

Post Callibration Reading

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 7.00		pH 7.00	**NIST**	320613	pH 7.0
2. pH 4.00		pH 4.00	**NIST**	320612	pH 4.0
3. mV		240mV	**NIST**	325420/325421	238mV
4. EC		2.49mS	**NIST**	322349	2.51mS
6. D.O		0 ppm	**NIST**	5928	0ppm
7. Temp		20.oC	**NIST**	MultiTherm 09000528	20.oC

Calibrated by: **Braeden Curtis**

Calibration date: **3-Jun-19**

Next calibration due: **30-Nov-19**

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-105896

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		
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:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		93ppm Isobutylene	NIST	BR100		93.5ppm

Calibrated by: Ben Pearson

Calibration date: 3/06/2019

Next calibration due: 3/07/2019

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **15K101083**

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 7.00		pH 7.00	**NIST**	320613	pH 7.00
2. pH 4.00		pH 4.00	**NIST**	307927	pH 4.00
3. mV		240mV	**NIST**	325420/325421	240mV
4. EC		2.76mS	**NIST**	304153	2.76mS
6. D.O		0 ppm	**NIST**	5928	0 ppm
7. Temp		24.oC	**NIST**	MultiTherm 09000528	24.oC

Calibrated by: **Braeden Curtis**

Calibration date: **11-Jun-19**

Next calibration due: **8-Dec-19**

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-113995

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		
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		93ppm Isobutylene	NIST	BR100		93.5ppm

Calibrated by: **Ben Pearson**

Calibration date: **11/06/2019**

Next calibration due: **8/12/2019**

Oil / Water Interface Meter

Instrument **Geotech Interface Meter (30M)**
Serial No. **4093**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
	above 7.9v		
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: **Ben Pearson**

Calibration date: **11-Jun-19**

Next calibration due: **08-Dec-19**

CERTIFICATE OF CALIBRATION

BLUE EARTH
ENVIRONMENTAL

Instrument: multi-parameter water quality sonde	**Model:** 615 manufactured in 2010
Make: Yeo-Kal	**Serial number:** 504

Instrument condition:

Sensor	Range	Accuracy	Calibration point		Initial reading	Calibration required	Final reading
Temperature	-2 - 50°C	±0.05°C	LOW	25.50	25.45	☐ Yes ☑ No	25.45
			HIGH	—	—	☐ Yes ☐ No	—
Electrical Conductivity	0 – 80 ~~mS/cm~~	±0.05 ~~mS/cm~~ ppt	LOW	0 ppt	0 ppt	☐ Yes ☒ No	0 ppt
	0 – 8000 ~~µS/cm~~	±5 ~~µS/cm~~ ppt	HIGH	36 ppt	33.4 ppt	☑ Yes ☐ No	36.0 ppt
pH	0 - 14	±0.03	LOW	7.00	7.11	☑ Yes ☒ No	7.00
			HIGH	10.00	10.06	☑ Yes ☐ No	10.00
Dissolved Oxygen	0 – 200% saturation	±0.05%	LOW	0.0	-5.2	☑ Yes ☐ No	-0.1
	0 – 20 mg/L		HIGH	100.0	89.5	☑ Yes ☐ No	100.3
Turbidity	0 – 600 NTU	±0.5 NTU	LOW	0	2.3	☑ Yes ☐ No	0.0
			HIGH	150.0	153.0	☑ Yes ☐ No	150.0

Date: 26/03/2019 ; 09:00	**Calibrated by:** Chris Pietsch	**Signature:**

CERTIFICATE OF CALIBRATION

BLUE EARTH ENVIRONMENTAL

Instrument: multi-parameter water quality sonde
Model: 615 manufactured in 2010
Make: Yeo-Kal
Serial number: 504
Instrument condition:

Sensor	Range	Accuracy	Calibration point		Initial reading	Calibration required	Final reading
Temperature	-2 - 50°C	±0.05°C	LOW	25.50	25.45	☐ Yes ☑ No	25.45
			HIGH	—	—	☐ Yes ☐ No	—
Electrical Conductivity	0 – 80 ~~mS/cm~~ 0 – 8000 ~~µS/cm~~	±0.05 ~~mS/cm~~ ppt ±5 ~~µS/cm~~ ppt	LOW	0 ppt	0ppt	☐ Yes ☒ No	0ppt
			HIGH	36 ppt	33.4 ppt	☑ Yes ☐ No	36.0 ppt
pH	0 - 14	±0.03	LOW	7.00	7.11	☑ Yes ☒ No	7.00
			HIGH	10.00	10.06	☑ Yes ☐ No	10.00
Dissolved Oxygen	0 – 200% saturation 0 – 20 mg/L	±0.05%	LOW	0.0	-5.2	☑ Yes ☐ No	-0.1
			HIGH	100.0	89.5	☑ Yes ☐ No	100.3
Turbidity	0 – 600 NTU	±0.5 NTU	LOW	0	2.3	☑ Yes ☐ No	0.0
			HIGH	150.0	153.0	☑ Yes ☐ No	150.0

Date: 26/03/2019 ; 09:00
Calibrated by: Chris Pietsch
Signature:

Queensland
Government

Fisheries Act 1994

General fisheries permit

20 March 2018

CHRISTOPHER PIETSCH
BLUE EARTH ENVIRONMENTAL
PO BOX 387
YANDINA QLD 4561

Delegate of the Chief Executive
Department of Agriculture and
Fisheries

Permit Number	Issue Date	Expiry Date
192540	22 June 2017	22 June 2020

AUTHORISED ACTIVITIES

(1) The holder is authorised to take, identify and release regulated fisheries resources from all Queensland waters for the purpose of fish salvage, research and monitoring.

(2) The holder is authorised to release fisheries resources collected during fish salvage operations into a suitable location within waters of the same catchment as the fish salvage operation.

(3) The holder is authorised to take and possess up to 5 of each species, per site sampled, excluding species that are listed as "no take" under the Fisheries Act 1994 or listed as "threatened species" under the Environment Protection and Biodiversity Conservation Act 1999 or as "endangered wildlife" under the Nature Conservation Act 1992 for the purpose of voucher specimens and tissue analysis

(4) The holder is authorised to take and possess up to 5 silver perch (Bidyanus bidyanus) and 5 Murray cod (Maccullochella peelii) per site sampled on private farm dams only where these species have been stocked from aquaculture production.

(5) The holder is authorised to use the following apparatus:
a. 3 x gill nets – up to 50m in length, 50mm to 200mm mesh and up to 3m drop
b. 2 x seine nets – up to 30m in length, 6mm to 300mm mesh and up to 3m drop
c. 4 x fyke nets - double wing with 5m wings and a 3.5m cod end
d. 1 x backpack electrofisher
e. 1 x boat mount electrofisher
f. 20 x box traps – 25cm x 25cm x40cm with 2mm mesh
g. 4 x cathedral traps – double chamber 3.5m in length with 30mm mesh
h. 2 x dip nets

It is your responsibility to advise of any change of address

i. Prescribed apparatus as detailed in Chapter 4, Part 1, Division 4, Subdivision 1 of the Fisheries Regulation 2008 (recreational apparatus)

CONDITIONS

(1) The permit extends to the holder (Christopher Pietsch), employees of Christopher Pietsch and any other person authorised by the holder. A person authorised by the holder must have a copy of the permit and written authorisation signed by the authority holder which states the name of the person undertaking the authorised activities, the authorised activities to be undertaken, locations to be fished and the period of authorisation.

(2) The holder must ensure that all apparatus used during authorised activities is marked clearly with the holders name, address and Department of Agriculture and Fisheries (DAF) permit number and be in attendance of such apparatus at all times. In attendance means within 100 metres when gill nets have been set. Fyke nets and traps are the only exceptions, and may be set and left unattended for up to 18 hours.

(3) A sign, minimum dimensions of 30cm x 50cm, with the message "Scientific Research in progress under DAF permit number 192540" is to be displayed within 15 metres of collecting activities when gill nets, seine nets and fyke nets are in use.

(4) The holder must not place nets across the width of creeks or rivers in navigation channels or any other areas where the placement of nets may be hazardous to boat traffic.

(5) The holder must ensure that gill nets are checked at intervals no greater than 30 minutes.

(6) Within the Mary River catchment, use of gill nets is restricted to nets of a maximum length of 10m and maximum mesh size of 75mm. DAF must be consulted prior to any gill net sampling in the Mary River catchment.

(7) The holder must ensure that fyke nets and cathedral traps are set in such a way that part of the cod end is above the water to allow air breathing animals access to air.

(8) The holder must ensure that all fish specimens taken are for fish salvage, research and monitoring purposes only and are not to be sold or consumed.

(9) The holder must ensure that all fish taken unintentionally during authorised activities are returned to the water as soon as practicable with as little harm or injury as possible.

(10) The holder must ensure that any fish collected under this permit that are considered restricted matter under the Biosecurity Act 2014 must be killed as soon as practicable and disposed of in a whole state either by burial in ground above the high water mark or placing in a waste disposal receptacle i.e. bin.

(11) The holder must ensure that the use of electrofishing apparatus is in accordance with the Australian Code of Electrofishing Practice.

(12) The holder must ensure that DAF is consulted prior to any fish salvage activities undertaken under this permit. DAF will advise on the appropriate location for release of salvaged fish. Generally, native fish are released into permanent water in the same catchment as close to the salvage location as possible.

(13) The holder must notify the local office of the Queensland Boating and Fisheries Patrol not less than 48 hours prior to any activities commencing under this permit.

(14) The holder must submit a written report one year after the issue of the permit and each subsequent year of the permit outlining the number and species of fisheries resources caught (including released, taken and incidental mortalities), apparatus used, locations fished and days fished to the Chief Executive, Fisheries Queensland, PO Box 46, Brisbane QLD 4001.

(15) The holder must carry this permit (or a copy) during authorised activities and produce it at any time on request for inspection by an officer authorised under the Fisheries Act 1994.

Appendix F

Surveying Report

400443 Water Monitoring Wells

BORE ID	EASTING	NORTHING	ELEVATION	CAP
GW09	366661.66	8134356.88	2.49	Steel Cover
			2.31	Plastic Cap
GW10	366474.01	8134577.92	2.15	Steel Cover
			2.01	Plastic Cap
GW08a	366357.59	8134859.54	2.47	Steel Cover
			2.34	Plastic Cap

Survey Control Mark Report

ADMINISTRATIVE

Mark Number	**90179**		
Alternate Names	**QGS 1271**	Town	**CAIRNS**
		Local Authority	**CAIRNS REGIONAL**
Locality Description	**ARNOLD/CAPT'N COOK**		
Related Information			

DETAILS

Mark Type	**STAND**			
Installed By	**DNR**	Connections	**SP276458**	18-Feb-2016
Installed Date	**08-Mar-1989**		**SP223137**	14-Nov-2008
Mark Condition	**GOOD**		**SP160302**	23-Apr-2003
Last Visited	**18-Feb-2016**		**SP146888**	09-May-2002
Sketch Available	**Yes**		**IS148741**	05-Mar-2001
			(8 connections)	

GDA94 COORDINATES

Lineage	**Datum**		
Latitude	**16° 52' 18.79338" S**	Horizontal Uncertainty	**0.009m**
Longitude	**145° 44' 22.73481" E**		
Ellipsoidal Height	**67.262m**	Vertical Uncertainty	**0.023m**
MGA94 Easting	**365744.234m**	MGA94 Point Scale	**0.99982288**
MGA94 Northing	**8134188.753m**	MGA94 Grid Conv	**-0° 21' 57.06"**
MGA94 Zone	**55**		
Published	**20-Nov-2018**	Fixed By	**GPS**
Adjustment	**QLD ANJ 18.11**		

AHD HEIGHT

Lineage	**Datum**		
Height	**4.292m**	Vertical Uncertainty	**Class D / 4th ORDER**
Published	**16-Mar-1992**	Fixed By	**SPIRIT LEVELLING**
Origin Mark		NLN Section	
Source	**LEAD17**		

QUEENSLAND GOVERNMENT

QUEENSLAND - DEPARTMENT OF NATURAL RESOURCES

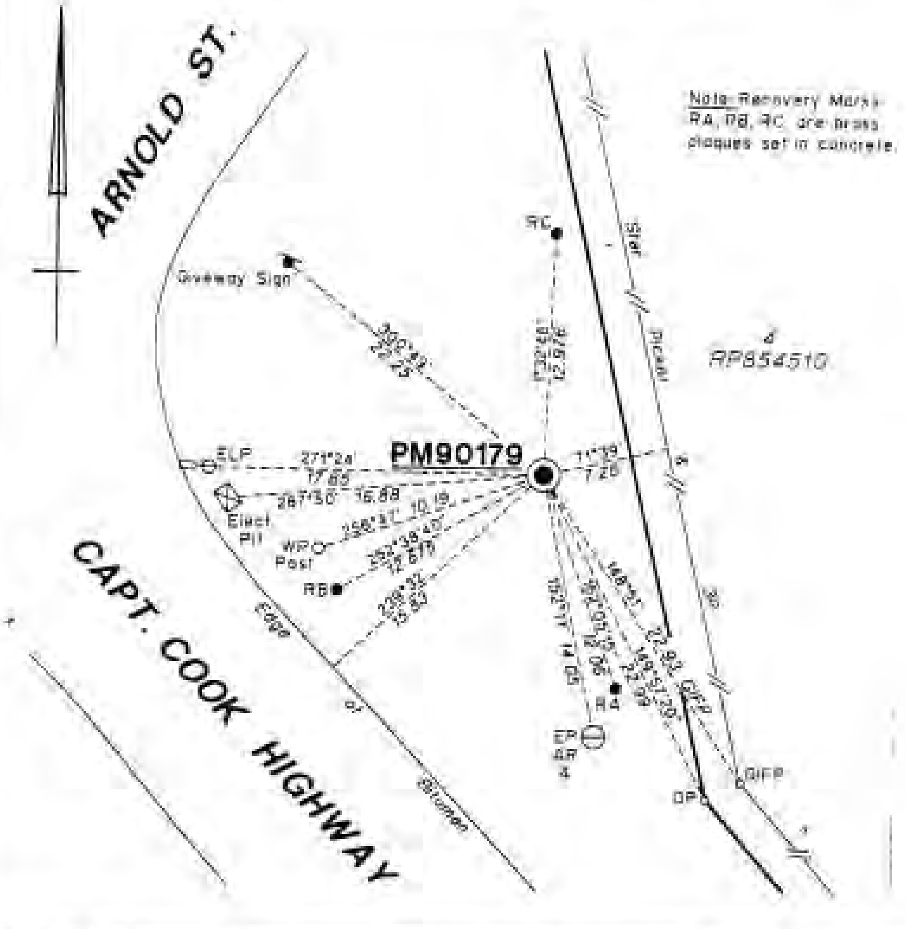
PERMANENT MARK SKETCH PLAN

REGD NO. 90179

NATURAL RESOURCES

Bearings are AMG'84 , Distances are metres

Sketch plan to be completed in accordance with the Department's QA document, "Completion of Permanent Mark Sketch Plans"



Sured'to GPS
Yes
Date 24/02/01

SCDB DETAILS ON REVERSE ARE TO BE COMPLETED

I certify that the permanent mark sketch has been prepared in accordance with the "The Survey Co-ordination Act of 1952-1989".

Date 14/3/01

Signature R.C. H L.S.

15/04/98

The Queensland Survey Control Register is the authoritative source for coordinate and height information.
The coordinate and height information contained on this document may not be the current information regarding this mark.

CADASTRAL POINT SUMMARY

REGISTRATION NO. 8064-00024
Office Use Only

CADASTRAL POINT	Stn 15 on RP 181798	ORIGIN OF CO-ORDINATES	PM 90179
CO-ORDINATES OF CADASTRAL POINT	CO-ORDINATED BY	M J Stoddart Clerk	DATE 30 01 95

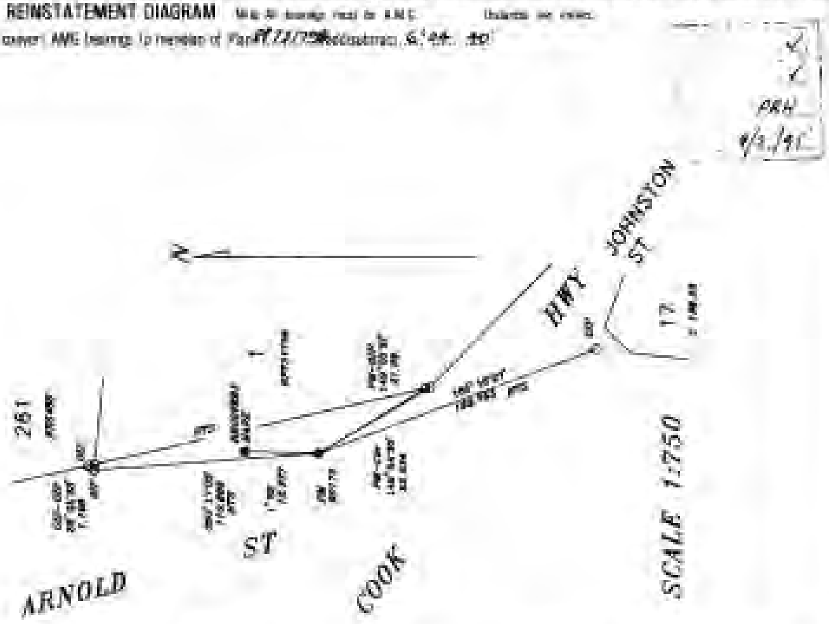
EASTING	NORTHING	ZONE	HEIGHT - AHD	LATITUDE	LONGITUDE	ACCURACY OF CO-ORDINATES
[illegible]	[illegible]	55	·	16 52 2[illegible]	145 44 09·1[illegible]	[illegible]

CAD DESCRIPTION	[illegible]
PARISH	CAIRNS
COUNTY	NARES
LOCAL AUTHORITY	CAIRNS

CADASTRAL REINSTATEMENT DIAGRAM

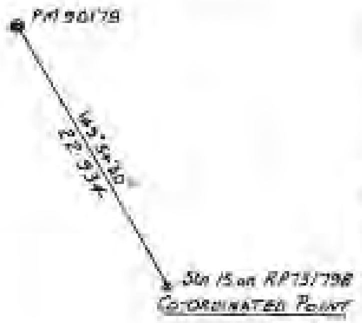
Note: All bearings must be A.M.G. Distances are metres.

To convert AMG bearings to meridian of Plan RP731798 add/subtract 6' 44. 30"



GEODETIC REINSTATEMENT AND CONNECTION

Note: Co-ordinated point must be a boundary point



AMG DERIVED FROM NRG947

CO-ORDINATES GENERATED FROM	LATITUDE	LONGITUDE	ZONE	EASTING	NORTHING	ORIGIN / ADJUSTMENT	DATE
PM 90179	16 52 24·3159	145 44 10·7653	55	365627·481	8138011·862		
	·	·		·	·		

REFERENCE BOOKS, FILES

REINSTATED BY
LICD. SURVEYOR

CHECKED

APPROVED

Office Use Only

Data Entered
Date

Data Validated
Date

Appendix G

Analytical Data Validation

Data Quality Objectives and Quality Assurance / Quality Control (QA/QC)

G1.1 Data Quality Objectives

The amended National Environmental Protection Measure (NEPM, Schedule B [2]) Guideline on Site Characterisation (2013) specifies that the nature and quality of the data produced in an investigation will be determined by the data quality objectives (DQOs). As referenced by the NEPM, the DQO process is detailed in the United States Environmental Protection Agency (US EPA) *Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4: EPA/240/B-06/001), February 2006.*

The US EPA defines the process as *'a strategic planning approach based on the Scientific Method that is used to prepare for a data collection activity. It provides a systematic procedure for defining the criteria that a data collection design should satisfy, including when to collect samples, where to collect samples, the tolerable level of decision errors for the study, and how many samples to collect'.*

The process of establishing appropriate DQOs is defined by the US EPA according to the following seven steps:

Step	Data Quality Objective
1	***State the problem*** – define the problem to be addressed, identify the planning team, examine budget and schedule.
2	***Identify the decision*** – outline the decision, the study question and alternative actions.
3	***Identify inputs to the decision*** – present parameters and inputs for decision, including information sources, basis for trigger/guideline levels, sampling and analysis methodology, etc.
4	***Define the study boundaries*** – present spatial and temporal limits for study, sample characteristics and decision-making units.
5	***Develop a decision rule*** – define a statistical parameter, specify trigger/guideline levels and develop argument for action.
6	***Specify limits on decision errors*** – set acceptable limits for decision errors relative to potential consequences such as health, budget, social or environmental impacts.
7	***Optimise the design for obtaining data*** – develop an effective sampling and analysis plan that meets resource and performance criteria.

The approach adopted relative to the seven steps presented above is discussed below. This methodology was adopted in developing the proposed fieldwork program.

G1.1.1 Step 1 - State the Problem to be Resolved

Investigations conducted between 2008 and 2018 have confirmed the presence of PFAS impacted media at Cairns Airport, including adjacent to areas utilised by ARFFS. ARFFS activities (among other sources) were identified to have contributed to the PFAS contaminant load at the Airport. Widespread historical use of AFFF containing PFAS, generally within designated firefighting facilities, has been documented in historical data reviews, and there is the potential that PFAS may have migrated across the broader Cairns Airport and potentially off-site to the Barron River and Trinity Bay. The PFAS contamination identified at the Site is legacy impact, given that in 2010 Airservices transitioned from using AFFF containing PFAS to fluorine free foam.

The geometry of the impact, transport mechanisms (potential for both on-site and off-site migration) and the potential impact to off-site receptors are not well understood and require further investigation to refine the CSM. Specifically, the following data gaps have been identified:

On-site data gaps:

- Sampling of surface water to allow better interpretation of migration of PFAS from the ARFFS fire station, including sampling along the stormwater drains such as the swale running from the ARFFS fire station to the Barron River
- Sampling of groundwater downgradient of the ARFFS FTG to assess the potential migration of impacted groundwater toward the Barron River (<500 m to the northeast)
- Sampling of groundwater downgradient of the ARFFS fire station, [redacted] and ARFFS workshop to assess the potential migration of impacted groundwater toward the drainage system (including discharge to swale drains)
- Sampling of groundwater in the vicinity of the ARFFS workshop and former fire station to assess the potential migration of impacted groundwater toward the Barron River
- Characterisation of PFAS soil impacts associated with the ARFFS workshop.

Off-site data gaps:

- Sampling of targeted aquatic biota to establish potential ecological impacts and inform preliminary risk to human health
- Sampling of water and sediment considered necessary to interpret the biota sampling
- Assessment of potential sources of PFAS which may migrate onto the Cairns Airport, including from the offsite WWTP. The Investigation does not address this data gap.

PFAS comprise a large group of compounds and are considered as "*emerging contaminants*". The information available on some of these compounds is limited, and research into their toxicity and behaviour is ongoing.

G1.1.2 Step 2 - Identify the Goal of the Study

The goal of the study is to obtain sufficient information to characterise the extent of the previously identified PFAS impact within Cairns Airport. These data are being used to improve the conceptual understanding of the distribution of PFAS impacts and refine the conceptual site model. The information will be used to inform if management strategies are required to manage potential risks associated with PFAS impacts.

G1.1.3 Step 3 - Identify Information Inputs

The following inputs were considered in addressing the goals of this study:

- Detailed review of previous investigations completed within the study area;
- Regulatory guidance as outlined in **Section 1.6** and any further correspondence from DES;
- Tier 1 health and ecological investigation and screening levels of each protected beneficial use applicable within the boundary of the investigation area and the respective receiving environment;
- Quantitative site characterisation data including: visual observations and field measurements made during intrusive investigations, laboratory analytical data from field samples (soil, sediment, groundwater and surface water), analytical data comparisons with screening criteria appropriate for the land use;
- Hydrogeological and hydrological data across the investigation area including gradient and flow direction;
- Publicly available information including aerial photographs, topographical, geological and soils maps;
- Review of environmental receptors; and
- Any additional relevant information provided by Airservices.

G1.1.4 Step 4 - Define the Boundaries of the Study

The spatial boundaries applied for data collection and decision making are shown in the figures in **Appendix A**.

The vertical extent of the investigation is the depth to the shallow aquifer system beneath Cairns Airport.

Temporal boundaries were limited to the proposed fieldwork timeframes and were between March 2019 and June 2019.

G1.1.5 Step 5 - Develop the Analytical Approach

The analytical approach includes:

- Samples of soil, groundwater, surface water, sediment and biota were analysed for PFAS;
- Samples of groundwater and surface water were analysed for major ions, and select samples of surface water and sediment were analysed for TRH, benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), metals and microbiological indicators.
- Results of the targeted sampling were initially be compared against Tier 1 screening criteria and the CSM was updated;

The decision rules pertaining to the data obtained during the DSI are as follows:

- If the laboratory quality assurance/quality control data are within the acceptable ranges, the data will be considered suitable for use;
- If the COPC are reported above the laboratory LOR or risk-based screening levels in one or more samples, then it will be considered whether further assessment or management measures are required; and
- If the COPC are reported below the laboratory detection limit in the samples applicable to a specific pathway, then it will be considered that the current data set does not provide evidence of a potential complete source-pathway-receptor linkage and therefore inclusion of that pathway in the risk assessment may not be required. Note that such decisions will also consider temporal and other data and will not rely solely on results in isolation.

The decision on the acceptance of the analytical data will be made on the basis of the Data Quality Indicators as follows:

- **precision:** a quantitative measure of the variability (or reproducibility) of data;
- **accuracy**: a quantitative measure of the closeness of reported data to the “true” value;
- **representativeness**: the confidence (expressed qualitatively) that data are representative of each media present;
- **completeness**: a measure of the amount of useable data from a data collection activity; and
- **comparability**: the confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event.

Precision

Suitable criteria and/or performance indicators for assessment of precision include:

- performance of intra-laboratory duplicate sample sets through calculation of relative percentage differences (RPDs); and
- performance of inter-laboratory duplicate sample sets through calculation of RPDs; and

The RPDs will be assessed as acceptable if less than or equal to 30% as per the NEPM Schedule B3. Where the result shows greater than 30% difference a review of the cause will be conducted (NEPM, 2013). It is noted that RPDs that exceed this range may be considered acceptable where:

- results are less than 10 times the LOR (no limit);
- results are less than 20 times the LOR and the RPD is less than 50%; and
- heterogeneous materials are encountered.

Accuracy (Bias)

The closeness of the reported data to the “true” value is assessed through review of the performance of:

- method blanks, which are analysed for the analytes targeted in the primary samples;
- matrix spikes and surrogate recoveries; and
- laboratory control samples.

Representativeness

To ensure the data produced by the laboratory is representative of conditions encountered in the field, the following steps are taken by the laboratory and subsequently reviewed by AECOM:

- blank samples will be run in parallel with field samples to confirm there are no unacceptable instances of laboratory cross contamination;
- review of RPD values for field and laboratory duplicates to provide an indication that the samples are generally homogeneous, with no unacceptable instances of significant sample matrix heterogeneities; and
- the appropriateness of collection methodologies, handling, storage and preservation techniques will be assessed to ensure/confirm there was minimal opportunity for sample interference or degradation.

Completeness

In validating the degree of completeness of the analytical data sets acquired the following is considered:

- whether standard operating procedures (SOPs) for sampling protocols have been adhered to;
- copies of all chain of custody (COC) documentation are reviewed and presented.

It can therefore be considered whether the proportion of “useable data” generated in the data collection activities is sufficient for the purposes of assessing the problem as stated in Step 1 above.

Comparability

Given that assessment data can comprise several data sets from separate sampling episodes, issues of comparability between data sets are reduced through adherence to SOPs and regulator endorsed or made guidelines and standards on each data gathering activity.

In addition, the data will be collected by experienced AECOM field staff and National Association of Testing Authorities accredited laboratories will be employed in all laboratory programs for soil, sediment and water analysis.

G1.1.6 Step 6 - Specify Performance or Acceptance Criteria

Specific limits for this project are in accordance with the appropriate guidance made or endorsed by state and national regulations, appropriate indicators of data quality, and standard procedures for field sampling and handling.

This step also examines the certainty of conclusive statements based on the available new site data collected. This should include the following points to quantify tolerable limits:

- a decision can be made based on a certainty assumption of 95% confidence in any given data set. A limit on the decision error will be 5% that a conclusive statement may be a false positive or false negative.
- a decision error in the context of the decision rule presented above would lead to either underestimation or overestimation of the risk level associated with a particular sampling area.

Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the site. To address this, the SAQP outlined minimum numbers of samples proposed to be collected from each media.

Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this, the following measures are proposed:

- sufficient sample mass was collected to facilitate analysis reported to standard laboratory detections limits. Collection of insufficient sample mass would result in raised detection limits;
- field staff followed a standard procedure when collecting samples, including decontamination of tools, removal of adhered soil to avoid false positives in results, and use of appropriate sample containers and preservation methods;
- laboratories followed a standard procedure when preparing samples for analysis and undertaking analysis; and
- laboratories to report quality assurance / quality control data for comparison with the DQIs established for the project.

G1.1.7 Step 7 - Optimise the Design for Obtaining Data

The methodology presented in this report is designed to meet the objectives described in **Section 1.2** and to achieve the nominated DQOs. Optimisation of the data collection process was achieved by:

- working closely with the analytical laboratories and sampling equipment suppliers to ensure that appropriate procedures and processes are developed and implemented prior to and during the fieldwork, to ensure that sample handling, and transport to and processing by, the analytical laboratories is as smooth as possible; and
- conducting sampling according to AECOM SOPs for the type of sampling being conducted.

G1.2 Assessment of Data Quality

The quality of data collected as part of this investigation is assessed on a range of factors including:

- documentation and data completeness; and
- data quality – comparability, representativeness, and precision and accuracy for sampling and analysis.

Assessment criteria for data quality indicators for samples are listed below in Table 1.

Table 1 Acceptance criteria for data quality indicators in laboratory analysis

Data Quality Indicator	Acceptance Criteria
Rinsate Blanks	Less than the laboratory LOR
Intra laboratory field duplicates (1) (3)	RPD less than ± 30 – 50 % (where results > 10 x LOR) (2)
Laboratory Duplicates (1) (2) (3)	RPDs less than: • 20 % for high level laboratory duplicates (i.e. >20 x LOR) • 50 % for medium level laboratory duplicates (i.e. 10 to 20 x LOR)
Matrix Spikes (3) (4)	Recoveries between 70 -130 % of the theoretical recovery or as nominated in the laboratory's QC report
Method Blanks	Less than the laboratory LOR
Laboratory Control Samples (5)	Recoveries between laboratory specified range for each analyte / analytical suite.
Surrogate Spikes	Recoveries for surrogates are test dependent and are based on USEPA Method SW846. Control limits are dynamic and vary for individual tests but are within the criteria described in USEPA Method SW846.

Notes:

1. Potential exceptions to this criterion may occur where sample variation or heterogeneity, rather than poor laboratory performance, is accountable for the poor reproducibility, or where the results are close to the LOR. This typical RPD range is obtained from AS 4482.1-2005 guide to the investigation and sampling of sites with potentially contaminated soil.

2. If the results are close to the LOR, then higher results will be accepted.
3. Criteria for sample duplicate and matrix spike results assume no sample heterogeneity. If samples are found to be heterogeneous with respect to a particular analyte the above criteria does not apply.
4. Assumes that samples are homogeneous and the background analyte level is less than 20 % of the spike level (refer to USEPA Method 8000B). Note that there is no requirement for matrix spikes to pass, as certain matrices may preclude recovery of spiked compounds. In this case, data will be accepted if lab control sample data meets the acceptance criteria.
5. 5.80 % of the compounds tested must fall within the control limits. Control limits are dynamic and vary for individual tests as per USEPA Method 8000B.
6. Decision errors may include collecting samples that are not representative of the contamination status of the material and/or analytical errors.

G1.3 Field QA/QC Data Assessment

G1.3.1 General

All work completed as part of this Post-PSI Targeted Sampling was conducted in accordance with standard AECOM environmental sampling protocols. The essential elements of the QA/QC program are presented in the Table 2.

Table 2 Essential elements of the field QA/QC program

Action	Description
Use of experienced personnel	Fieldwork was undertaken by trained AECOM personnel with previous experience in contaminated site assessment, field sampling techniques and health and safety procedures.
Record keeping	Date, field personnel details, observations and findings of field activities. Recording of sample description and collection details on standard AECOM field sheets.
Sample collection	New nitrile gloves were worn during soil and water sampling and were replaced between each sample collection.
Sample labelling	A unique sample number was used for each sample to specify the sample origin (Sample location ID and date), preservation standards and analytical requirements.
Chain of custody	Standard AECOM COC procedures were adopted for sample transfers. COC documentation included sample numbers; date of sampling / collection; analyses required; and release and receipt of parties accepting sample custody.
Sample storage	Samples were collected in appropriate sample containers supplied by the analytical laboratory. Samples were placed in cool storage on ice prior to transfer to the laboratory.
Decontamination	All equipment used in the sampling process was decontaminated using deionised water prior to mobilisation and between sampling locations to reduce the risks of cross contamination.

In addition to the primary samples, quality control field duplicate samples were collected to assess aspects of field protocols and laboratory performance and to classify the validity of the laboratory data. Field duplicates were collected in general accordance with AS 4482.1-2005 guide to the investigation and sampling of sites with potentially contaminated soil (Standards Australia 2005).

G1.3.2 Handling and Sample Preservation

The laboratories reported that all samples were received in appropriately pre-treated and preserved containers with the exception listed in Table 3 below. All samples were received chilled at the laboratory.

Table 3 Sample Containers / Preservation non-conformances

Lab Report	Sample ID	Analytical Method	Sample Container Received by Laboratory	Preferred Sample Container for Analysis
EB1908167	SS10, SS11, SS12, SS13, QC100	Total Mercury by FIMS: EG035T	HDPE Soil Jar	Soil Glass Jar - Unpreserved
	SS10, SS11, SS12, SS13, QC100	TRH – Semivolatile Fraction: EP071	HDPE Soil Jar	Soil Glass Jar - Unpreserved
	SS10, SS11, SS12, SS13, QC100	TRH Volatiles / BTEX: EP080	HDPE Soil Jar	Soil Glass Jar - Unpreserved

G1.3.3 Frequency of Field Quality Control Samples

Field duplicate samples (intra-laboratory duplicates) and field triplicate samples (inter-laboratory duplicates) were collected and labelled so that they could not be linked to their respective primary samples.

Field duplicate and triplicate samples for groundwater, surface water , soil, and sediment were collected at a rate of 1 duplicate / triplicate pair per 10 primary samples (10 %) in accordance with the NEMP (HEPA, 2018). These samples were prepared in the field by equally splitting the primary field samples. Overall, the number of quality control samples meets the 10% target (initial total of 58 primary samples with 25 quality control samples).

Given the nature of the biota samples collected, it was not considered practicable/feasible to collect representative field duplicate samples.

A total of eight blanks were analysed which meets the 10% target recommended in the NEMP (HEPA and DoEE, 2018).

G1.3.4 Relative Percentage Difference (RPD) Calculations

A RPD analysis of primary and duplicate / triplicate samples is used to measure the representativeness and/or precision of duplicate samples. The RPD is calculated from the absolute difference between results of the duplicate pair divided by the mean value of the duplicate pair.

$$RPD\ (\%) = 100\ x\ (D1 - D2)\ /\ ((D1 + D2)\ /\ 2)$$

$$Where: D1 = primary\ sample\ analysis, D2 = duplicate\ sample\ analysis$$

AS 4482.1-2005 states that the typical RPD expected from acceptable field duplicates is < ± 30 – 50 % of the mean concentration of the analyte, where the results are greater than ten times the LOR.

The acceptable ranges adopted are:

- unlimited for laboratory duplicates between 0 - 10 x LOR;
- 50 % for laboratory duplicates between 10 - 30 x LOR;
- 30 % for laboratory duplicates greater than 30 x LOR;
- where concentrations for either the primary or the duplicate / triplicate sample are reported below LOR RPD calculations are not possible.

The RPD results for soil samples are provided in **Table G1**. No RPD non-conformances were identified in the data.

The RPD results for sediment samples are provided in **Table G2** with the RPD non-conformances summarised in Table 4.

Table 4 Summary of PFAS RPD non-conformances – sediment

Primary Sample ID	QC sample ID	Type	PFHxS	PFHpS	PFOS	PFPeA	PFOA
			RPD (%)				
SS09_190605	QC204_190605	Triplicate	52	58	86	33	48

The RPD values for the sediment samples were within the accepted criteria with the exception of the exceedances highlighted in the table above. The RPD results are not considered to impact the interpretation for this investigation but do demonstrate that differences in laboratory analysis and extraction methods in groundwater samples should be considered in assessing the contamination status of the investigation area. The high RPDs may be related to low detected concentrations at or near the limit of reporting. It is noted that both the QC sample results were within the same order of magnitude as the primary sample and therefore variance reported does not change the outcome of this investigation.

The RPD results for groundwater samples are provided in **Table G3** with the RPD non-conformances summarised in Table 5.

Table 5 Summary of PFAS RPD non-conformances – groundwater

Primary Sample ID	QC sample ID	Type	PFBA	6:2 FTS	PFOS	PFPeA
			RPD (%)			
CA03_190605	QC206_190605	Triplicate	107	62		
GW08A_190605	QC202_190605	Triplicate			37	64

The RPD values for the groundwater samples were within the accepted criteria with the exception of the two exceedances highlighted in the table above. The RPD results are not considered to impact the interpretation for this investigation but do demonstrate that differences in laboratory analysis and extraction methods in groundwater samples should be considered in assessing the contamination status of the investigation area. The high RPDs may be related to low detected concentrations at or near the limit of reporting. It is noted that both the QC sample results were within the same order of magnitude as the primary sample and therefore variance reported does not change the outcome of this investigation.

The RPD results for surface water samples are provided in **Table G4**. All samples were within the RPD ranges stipulated, with the exception of duplicate sample QC102 (primary sample SW10_E). The RPD value for Total Coliforms in this sample was calculated at 65 % which exceeds the acceptable criteria stipulated. It is noted that the QC sample result were within the same order of magnitude as the primary sample and therefore variance reported does not change the outcome of this investigation.

G1.3.5 Rinsate Blank Samples

Rinsate blanks were collected from sampling equipment (soil, sediment, groundwater and surface water) which was decontaminated and re-used by passing laboratory supplied deionised water over the sampling equipment following decontamination procedures. The analytical results for the rinsate samples are presented in **Table G5**. Of the six rinsate samples obtained, one returned results above LOR. In sample QC303_190605, EtFOSA reported a concentration of 0.25 µg/L which is one order of magnitude higher than the laboratory LOR. This rinsate sample was collected from the IP probe. As EtFOSA was not detected in any of the groundwater samples, the result is considered to be a laboratory error.

This indicates that field decontamination procedures were adequate, and the data were considered acceptable for intended use.

G1.4 Laboratory QA/QC

The laboratories used in the investigation (ALS for primary and duplicate samples and NMI and Eurofins for triplicate samples) are National Association of Testing Authorities (NATA) approved for the analyses required. Quality assurance procedures adopted by the analytical laboratories included analysis of blanks, duplicates, laboratory control samples and matrix spikes.

The different types of laboratory QC samples and select batches where one or more laboratory control samples were outside the limits are discussed below.

G1.4.1 Extraction and Analysis Holding Time

All samples were received and extracted within the recommended holding times with the exception of the analysis time outliers summarised in Table 6.

Table 6 Analysis holding time outliers

Lab Report	Sample ID	Analyte	Days Overdue
EB1914865	SS03_190604 SS04_190604	Fluoride	2
	SS01_190605 SS02_190605 SS05_190605 SS06_190605 SS07_190605 SS08A_190605 SS09_190605		1
	GW05_190604 GW09_190604 GW10_190604 SW03_190604 SW04_190604	Phosphorous as P	4
	CA01_190605 CA03_190605 CA08_190605 MW05_190605 GW02_190605 GW03_190605 GW04_190605 GW07_190605 GW08A_190605 SW01_190605 SW02_190605 SW05_190605 SW06_190605 SW07_190605 SW08A_190605 SW09_190605		3
EB1908167	SW11_F SW12_F SW13_F	Faecal Coliforms & E.coli	1
	SW11_F SW12_F SW13_F	Coliforms	2
	SW10_F		1

The analysis holding time errors were for fluoride, phosphorous and coliforms, therefore these outliers do not affect the outcome of this report.

G1.4.2 Method Blanks

The quality control term *method 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 type is to monitor potential laboratory contamination. All the laboratory blanks were within the DQO limits for this investigation. Method blank concentrations were not detected above the LOR for all analytes.

G1.4.3 Laboratory Control Sample

The quality control term *laboratory control sample* (LCS) refers to a known, interference free matrix spiked with target analytes or certified reference material. The purpose of this QC type is to monitor method precision and accuracy independent of sample matrix. Accepted frequency of LCS samples is 1 in 20. No LCS outliers were identified with the exception of:

- EB1913763
    - PFTrDA recovery was less than the lower control limit

G1.4.4 Laboratory Duplicates

The quality control term *laboratory duplicate* refers to an intra-laboratory split sample randomly selected from the sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity. RPDs are used to assess precision. Frequency of laboratory duplicate samples is 1 in 10.

The RPDs for laboratory duplicate samples were within the limits for all analytes.

G1.4.5 Matrix Spikes

The quality control term *matrix spike* (MS) refers to an intra-laboratory split sample spiked with a representative set of target analytes. The purpose of this QC type is to monitor potential matrix effects on analyte recoveries. The samples undergo the same extraction and analysis procedures and the results are used to assess the method precision and bias. Spike recoveries are reported as a percent recovery. Frequency of MS samples is 1 in 20. MS outliers are as follows:

- ES1910340
    - Biota – PFBA, PFPeA (recovery less than lower DQO)
- EB1914865
    - Soil – C6-C9 Fraction, C6-C10 Fraction, Benzene, Toulene, PFBA (recovery less than lower DQO)
    - Water – C10-C14 Fraction, >C10-C16 Fraction (recovery less than lower DQO)
- EB1915332
    - Water – Sulfate as SO4 (sample background levels being greater than four times the spike level, therefore MS recoveries could not be determined)
- EB1913763
    - Soil – PFOS (recovery greater than upper DQO)
    - Water – PFTrDA (recovery less than lower DQO)
- EB1908167
    - Soil – PFDS (recovery less than lower DQO)

Non-conformances in batches ES1910340, EB1914865 and EB1908167 were due to recoveries outside of the DQO while non-conformances in batch EB1915332 were a result of sample background levels being greater than four times the spike level, therefore MS recoveries could not be determined.

These outliers are not deemed significant, and data are considered acceptable for use.

G1.4.6 Surrogate Spikes

The quality control term *surrogate spike* (SS) refers to a compound added to a sample aliquot in known amounts before extraction and analysis. The compound should be similar in composition and behaviour to the target analyte but not naturally occurring in the sample. A surrogate is used to monitor the method performance for analysis of compounds. Spike recoveries are reported as a percent recovery. The following batches reported SS recoveries outside the limits for select analytes in:

- EB1914865 – 13C4 PFOS (SS03_190604, SS05_190695, SS06_190605) and 13C8-PFOA (SS03_190604, SS05_190695)
- EB1913763 – 13C4 PFOS (BH02_0.0-0.1, QC100_190528) and 13C8-PFOA (BH02_0.0-0.1, QC100_190528)

Surrogate recoveries in these samples were lower than the DQO due to sample matrix interferences. These non-conformances are not considered significant.

G1.4.7 Frequency of Laboratory QC samples

The laboratory reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision for all batches submitted.

G1.5 Conclusions

While non-conformances with the laboratory QA/QC have been identified, they are not considered to adversely impact the purpose of the investigation. It is concluded that, for the purposes of this investigation, the data are suitable for interpretation and acceptable for use in this assessment.

Table G1 Soil Duplicate and Triplicate Analytical Results

			Lab Report	EB1913763	EB1913763		EB1913763	RN1235112	
			Field ID	BH02_0.0-0.1	QC100_190528		BH02_0.0-0.1	QC200_190528	
			Sampled Date	28/05/2019	28/05/2019		28/05/2019	28/05/2019	
			Sample Type	Primary	Duplicate		Primary	Triplicate	
Group	**Chemical Name**	**Units**	**EQL**			**RPD**			**RPD**
PFAS	Sum (PFHxS + PFOS)	mg/kg	0.0002	0.0013	0.0018	32	0.0013		
	PFBS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFPeS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFHxS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFHpS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFOS	mg/kg	0.0002 : 0.002 (Interlab)	0.0013	0.0018	32	0.0013	0.0083	146
	PFBA	mg/kg	0.001 : 0.01 (Interlab)	<0.001	<0.001	0	<0.001	<0.002	0
	PFPeA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFHxA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFHpA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFOA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFDS	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFNA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFDcA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFUnA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFDoA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFTrDA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFTeDA	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.002	0
	4:2 FTS	mg/kg	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0
	6:2 FTS	mg/kg	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0
	8:2 FTS	mg/kg	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0
	10:2 FTS	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.002	0
	MeFOSAA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.002	0
	EtFOSAA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.002	0
	FOSA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0
	N-Et-FOSA	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.002	0
	N-Me-FOSA	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.002	0
	N-MeFOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0
	N-Et-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0
	Sum of PFAS	mg/kg	0.0002	0.0013	0.0018	32	0.0013		

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

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-20 x EQL); 30 (> 20 x EQL))

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

Table G2 Sediment Duplicate and Triplicate Analytical Results

			Lab Report	EB1908167	EB1908167		EB1914865	EB1914865		EB1914865	RN1236817		EB1908167	EB1908167		EB1908167	RN1230043	
			Field ID	PW10	QC101		SS09_190605	QC104_190605		SS09_190605	QC204_190605		SS10	QC100		SS10	QC200	
			Sampled Date	28/03/2019	28/03/2019		5/06/2019	5/06/2019		5/06/2019	5/06/2019		28/03/2019	28/03/2019		28/03/2019	28/03/2019	
			Sample Type	Primary	Duplicate		Primary	Duplicate		Primary	Triplicate		Primary	Duplicate		Primary	Triplicate	
Group	**Chemical Name**	**Units**	**EQL**			**RPD**			**RPD**			**RPD**			**RPD**			**RPD**
PFAS	Sum (PFHxS + PFOS)	mg/kg	0.0002	0.0002	0.0002	0	0.417	0.444	6	0.417			0.0002	0.0002	0	0.0002		
	PFBS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0139	0.0116	18	0.0139	0.012	15	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFPeS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0138	0.015	8	0.0138	0.015	8	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFHxS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0999	0.113	12	**0.0999**	**0.17**	**52**	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFHpS	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0066	0.0082	22	**0.0066**	**0.012**	**58**	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFOS	mg/kg	0.0002 : 0.002 (Interlab)	0.0002	0.0002	0	0.317	0.331	4	**0.317**	**0.8**	**86**	0.0002	0.0002	0	0.0002	<0.002	0
	PFBA	mg/kg	0.001 : 0.01 (Interlab)	<0.001	<0.001	0	<0.003	<0.003	0	<0.003	<0.01	0	<0.001	<0.001	0	<0.001	<0.005	0
	PFPeA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	0.0108	0.0113	5	**0.0108**	**0.015**	**33**	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFHxA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0295	0.0296	0	0.0295	0.028	5	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFHpA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0089	0.0091	2	0.0089	0.0095	7	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFOA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0098	0.0108	10	**0.0098**	**0.016**	**48**	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFNA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0014	0.002	35	0.0014	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFDS	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	0.001	0.0004	86	0.001	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFDcA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0008	0.0009	12	0.0008	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.001	0
	PFUnA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	0.001	0.0008	22	0.001	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFDoA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	0.001	0.0006	50	0.001	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFTrDA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	0.0002	0.0003	40	0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.002	0
	PFTeDA	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0006	<0.0006	0	<0.0006	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.002	0
	4:2 FTS	mg/kg	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
	6:2 FTS	mg/kg	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
	8:2 FTS	mg/kg	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
	10:2 FTS	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.002	0
	MeFOSAA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.002	0
	N-MeFOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0006	<0.0006	0	<0.0006	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	EtFOSAA	mg/kg	0.0002 : 0.002 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.002	0
	FOSA	mg/kg	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	0.0014	0.001	33	0.0014	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.001	0
	N-Et-FOSA	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0006	<0.0006	0	<0.0006	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.002	0
	N-Me-FOSA	mg/kg	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0	<0.0006	<0.0006	0	<0.0006	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.002	0
	N-Et-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0006	<0.0006	0	<0.0006	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	Sum of PFAS	mg/kg	0.0002	0.0002	0.0002	0	0.517	0.546	5	0.517			0.0002	0.0002	0	0.0002		
TRH	C6-C10 fraction	mg/kg	10 : 25 (Interlab)	<10	<10	0							<10	<10	0	<10	<25	0
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10 : 25 (Interlab)	<10	<10	0							<10	<10	0	<10	<25	0
	>C10-C16 fraction	mg/kg	50	50	<50	0							<50	<50	0	<50	<50	0
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	50	<50	0							<50	<50	0	<50	<50	0
	>C16-C34 fraction	mg/kg	100	<100	<100	0							<100	<100	0	<100	<100	0
	>C34-C40 fraction	mg/kg	100	<100	<100	0							<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	mg/kg	50	50	<50	0							<50	<50	0	<50		
MAH	Benzene	mg/kg	0.2 : 0.5 (Interlab)	<0.2	<0.2	0							<0.2	<0.2	0	<0.2	<0.5	0
	Toluene	mg/kg	0.5	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
	Ethylbenzene	mg/kg	0.5	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
	m&p-Xylene	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<1	0
	o-Xylene	mg/kg	0.5	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
	Total Xylenes	mg/kg	0.5	<0.5	<0.5	0							<0.5	<0.5	0	<0.5		
	Total BTEX	mg/kg	0.2	<0.2	<0.2	0							<0.2	<0.2	0	<0.2		
	Naphthalene (VOC)	mg/kg	1	<1	<1	0							<1	<1	0	<1		
Metals	Arsenic	mg/kg	5 : 0.5 (Interlab)	18	16	12							18	18	0	18	15	18
	Cadmium	mg/kg	1 : 0.5 (Interlab)	<1	<1	0							<1	<1	0	<1	<0.5	0
	Chromium	mg/kg	2 : 0.5 (Interlab)	31	33	6							33	33	0	33	36	9
	Copper	mg/kg	5 : 0.5 (Interlab)	14	15	7							15	16	6	15	17	13
	Lead	mg/kg	5 : 0.5 (Interlab)	22	22	0							21	21	0	21	19	10
	Mercury	mg/kg	0.1 : 0.01 (Interlab)	<0.1	<0.1	0							<0.1	<0.1	0	<0.1	<0.2	0
	Nickel	mg/kg	2 : 0.5 (Interlab)	13	14	7							16	15	6	16	19	17
	Zinc	mg/kg	5 : 0.5 (Interlab)	54	55	2							55	56	2	55	58	5

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

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-20 x EQL); 30 (> 20 x EQL))

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

Table G3 Groundwater Duplicate and Triplicate Analytical Results

			Lab Report	EB1914865	EB1914865		EB1914865	RN1236817		EB1914865	EB1914865		EB1914865	RN1236817		EB1914865	EB1914865		EB1914865	RN1236817	
			Field ID	CA03_190605	QC106_190605		CA03_190605	QC206_190605		GW04_190605	QC103_190605		GW04_190605	QC203_190605		GW08A_190605	QC102_190605		GW08A_190605	QC202_190605	
			Sampled Date	5/06/2019	5/06/2019		5/06/2019	5/06/2019		5/06/2019	5/06/2019		5/06/2019	5/06/2019		5/06/2019	5/06/2019		5/06/2019	5/06/2019	
			Sample Type	Primary	Duplicate		Primary	Triplicate		Primary	Duplicate		Primary	Triplicate		Primary	Duplicate		Primary	Triplicate	
Group	**Chemical Name**	**Units**	**EQL**			**RPD**			**RPD**			**RPD**			**RPD**			**RPD**			**RPD**
PFAS	Sum (PFHxS + PFOS)	ug/L	0.002	46.8	50.7	8	46.8			0.026	0.023	12	0.026			0.252	0.234	7	0.252		
	PFBS	µg/L	0.002 : 0.001 (Interlab)	0.99	1.08	9	0.99	1.1	11	0.003	0.002	40	0.003	0.0041	31	0.019	0.02	5	0.019	0.022	15
	PFPeS	µg/L	0.002 : 0.001 (Interlab)	1.44	1.51	5	1.44	1.3	10	<0.002	<0.002	0	<0.002	0.0029	37	0.017	0.017	0	0.017	0.02	16
	PFHxS	µg/L	0.002 : 0.001 (Interlab)	13.2	14.1	7	13.2	15	13	0.021	0.019	10	0.021	0.019	10	0.212	0.198	7	0.212	0.27	24
	PFHpS	µg/L	0.002 : 0.001 (Interlab)	1.14	1.31	14	1.14	0.85	29	<0.002	<0.002	0	<0.002	<0.001	0	0.013	0.013	0	0.013	0.01	26
	PFOS	µg/L	0.002	33.6	36.6	9	33.6	41	20	0.005	0.004	22	0.005	0.0052	4	0.04	0.036	11	**0.04**	**0.058**	**37**
	PFBA	µg/L	0.01 : 0.005 (Interlab)	0.16	0.16	0	**0.16**	**0.53**	**107**	<0.01	0.01	0	<0.01	0.0051	0	0.03	0.02	40	0.03	0.035	15
	PFDS	µg/L	0.002 : 0.001 (Interlab)	<0.01	<0.01	0	<0.01	0.0019	0	<0.002	<0.002	0	<0.002	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0
	PFPeA	ug/L	0.002	1.1	1.23	11	1.1	1.2	9	<0.002	<0.002	0	<0.002	<0.002	0	0.016	0.014	13	**0.016**	**0.031**	**64**
	PFHxA	µg/L	0.002 : 0.001 (Interlab)	3.86	4.26	10	3.86	4.1	6	<0.002	<0.002	0	<0.002	0.0033	49	0.039	0.037	5	0.039	0.046	16
	PFHpA	µg/L	0.002 : 0.001 (Interlab)	1.08	1.12	4	1.08	1.1	2	<0.002	<0.002	0	<0.002	<0.001	0	0.01	0.009	11	0.01	0.012	18
	PFOA	µg/L	0.002 : 0.001 (Interlab)	1.79	1.81	1	1.79	1.7	5	<0.002	<0.002	0	<0.002	<0.001	0	0.02	0.019	5	0.02	0.022	10
	PFNA	µg/L	0.002 : 0.001 (Interlab)	0.175	0.192	9	0.175	0.18	3	<0.002	<0.002	0	<0.002	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0
	PFDcA	µg/L	0.002 : 0.001 (Interlab)	0.04	0.038	5	0.04	0.048	18	<0.002	<0.002	0	<0.002	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0
	PFUnA	µg/L	0.002 : 0.001 (Interlab)	<0.01	<0.01	0	<0.01	0.0018	0	<0.002	<0.002	0	<0.002	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0
	PFDoA	µg/L	0.002 : 0.001 (Interlab)	<0.01	<0.01	0	<0.01	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0
	PFTrDA	µg/L	0.002	<0.01	<0.01	0	<0.01	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0
	PFTeDA	µg/L	0.005 : 0.002 (Interlab)	<0.025	<0.025	0	<0.025	<0.002	0	<0.005	<0.005	0	<0.005	<0.002	0	<0.005	<0.005	0	<0.005	<0.002	0
	4:2 FTS	ug/L	0.005 : 0.001 (Interlab)	<0.01	<0.01	0	<0.01	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0
	6:2 FTS	µg/L	0.005 : 0.001 (Interlab)	<0.01	<0.05	0	**<0.01**	**0.019**	**62**	<0.005	<0.005	0	<0.005	0.0046	0	<0.005	<0.005	0	<0.005	<0.001	0
	8:2 FTS	µg/L	0.005 : 0.001 (Interlab)	0.04	0.033	19	0.04	0.036	11	<0.005	<0.005	0	<0.005	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0
	10:2 FTS	µg/L	0.005 : 0.001 (Interlab)	<0.01	<0.01	0	<0.01	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0
	N-MeFOSE	ug/L	0.005	<0.025	<0.025	0	<0.025	<0.005	0	<0.005	<0.005	0	<0.005	<0.005	0	<0.005	<0.005	0	<0.005	<0.005	0
	MeFOSAA	µg/L	0.002	<0.01	<0.01	0	<0.01	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0
	EtFOSAA	µg/L	0.002	<0.01	<0.01	0	<0.01	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0	<0.002	<0.002	0
	FOSA	µg/L	0.002 : 0.001 (Interlab)	<0.01	<0.01	0	<0.01	0.0018	0	<0.002	<0.002	0	<0.002	<0.001	0	<0.002	<0.002	0	<0.002	<0.001	0
	N-Et-FOSA	µg/L	0.005 : 0.002 (Interlab)	<0.025	<0.025	0	<0.025	<0.002	0	<0.005	<0.005	0	<0.005	<0.002	0	<0.005	<0.005	0	<0.005	<0.002	0
	N-Me-FOSA	µg/L	0.005 : 0.002 (Interlab)	<0.025	<0.025	0	<0.025	<0.002	0	<0.005	<0.005	0	<0.005	<0.002	0	<0.005	<0.005	0	<0.005	<0.002	0
	N-Et-FOSE	µg/L	0.005	<0.025	<0.025	0	<0.025	<0.005	0	<0.005	<0.005	0	<0.005	<0.005	0	<0.005	<0.005	0	<0.005	<0.005	0

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

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-20 x EQL); 30 (> 20 x EQL))

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

Table G4 Surface Water Duplicate and Triplicate Analytical Results

			Lab Report	EB1908167	EB1908167		EB1914865	EB1914865		EB1914865	2-Sep-08		EB1908167	RN1230043	
			Field ID	SW10 E	QC102		SW06 190605	QC105 190605		SW06 190605	QC205 190605		SW10 E	QC201	
			Sampled Date	29/03/2019	29/03/2019		5/06/2019	5/06/2019		5/06/2019	5/06/2019		29/03/2019	29/03/2019	
			Sample Type	Primary	Duplicate		Primary	Duplicate		Primary	Triplicate		Primary	Triplicate	
Group	**Chemical Name**	**Units**	**EQL**			**RPD**			**RPD**			**RPD**			**RPD**
PFAS	Sum (PFHxS + PFOS)	ug/L	0.0003	0.0004	0.0008	67							0.0004		
	PFBS	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFPeS	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFHxS	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFHpS	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFOS	µg/L	0.0003 : 0.002 (Interlab)	0.0004	0.0008	67							0.0004	<0.002	0
	PFDS	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFBA	µg/L	0.002	<0.002	<0.002	0							<0.002	<0.005	0
	PFPeA	ug/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.002	0
	PFHxA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFHpA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFOA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFNA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFDcA	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFUnA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFDoA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.001	0
	PFTrDA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.002	0
	PFTeDA	µg/L	0.0005	<0.0005	<0.0005	0							<0.0005	<0.002	0
	4:2 FTS	ug/L	0.001	<0.001	<0.001	0							<0.001	<0.001	0
	6:2 FTS	µg/L	0.001	<0.001	<0.001	0							<0.001	<0.001	0
	8:2 FTS	µg/L	0.001	<0.001	<0.001	0							<0.001	<0.001	0
	10:2 FTS	µg/L	0.001	<0.001	<0.001	0							<0.001	<0.001	0
	MeFOSAA	µg/L	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.002	0
	EtFOSAA	µg/L	0.0005 : 0.002 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.002	0
	FOSA	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0							<0.0005	<0.001	0
	N-Et-FOSA	µg/L	0.001 : 0.002 (Interlab)	<0.001	<0.001	0							<0.001	<0.002	0
	N-Me-FOSA	µg/L	0.001 : 0.002 (Interlab)	<0.001	<0.001	0							<0.001	<0.002	0
	N-Et-FOSE	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0							<0.001	<0.005	0
	Sum of PFAS	µg/L	0.0003	0.0004	0.0008	67							0.0004		
	N-MeFOSE (24448-09-7)	ug/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0							<0.001	<0.005	0
TRH	C6-C10 fraction	µg/L	20	<20	<20	0	<20	<20	0	<20	<20	0	<20	<25	0
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	0	<20	<20	0	<20	<20	0	<20	<25	0
	>C10-C16 fraction	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<100	0	<100	<50	0	<100	<25	0
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<100	0	<100	<50	0	<100	<25	0
	>C16-C34 fraction	µg/L	100	<100	<100	0	150	160	6	150	<100	40	<100	<100	0
	>C34-C40 fraction	µg/L	100	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	0	150	160	6	150	<100	40	<100		
MAH	Benzene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
	Toluene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<2	0	<2	<1	0	<2	<1	0
	Ethylbenzene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<2	0	<2	<1	0	<2	<1	0
	m&p-Xylene	µg/L	2	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0
	o-Xylene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<2	0	<2	<1	0	<2	<1	0
	Total Xylenes	µg/L	2 : 3 (Interlab)	<2	<2	0	<2	<2	0	<2	<3	0	<2		
	Total BTEX	µg/L	1	<1	<1	0	<1	<1	0	<1			<1		
	Naphthalene (VOC)	µg/L	5	<5	<5	0	<5	<5	0	<5			<5		
Metals	Arsenic	ug/L	1	1	1	0	1	1	0	1	1	0	1	1.2	18
	Cadmium	ug/L	0.1 : 0.2 (Interlab)	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0
	Chromium	ug/L	1	1	1	0	<1	<1	0	<1	<1	0	1	1.4	33
	Copper	ug/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	1	0
	Lead	ug/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
	Mercury	ug/L	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	ug/L	1	<1	<1	0	3	3	0	3	<1	100	<1	1	0
	Zinc	ug/L	5 : 1 (Interlab)	<5	<5	0	7	9	25	7	6	15	<5	3.3	0
Biological	E. Coli	CFU/100mL	1	280	320	13							280		
	Faecal Coliform	CFU/100mL	1	560	480	15							560		
	Total Coliforms	CFU/100mL	1	**5700**	**2900**	**65**							5700		

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-20 x EQL); 30 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table G5 Rinsate and Trip Blank Analytical Results

			Sample	QC300_190530	QC301_190531	QC302_190532	QC303_190605	QC304_190605	QC305_190612	QC401_190605
			Date	28/05/2019	28/05/2019	28/05/2019	5/06/2019	5/06/2019	12/06/2019	5/06/2019
			Type	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Trip_B
Group	**Chemical Name**	**Units**	EQL	EB1913763	EB1913763	EB1913763	EB1914865	EB1914865	EB1915332	EB1914865
PFAS	PFDS	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	Sum (PFHxS + PFOS)	ug/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	-
	PFBS	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFPeS	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFHxS	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFHpS	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFOS	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	-
	PFBA	µg/L	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-
	PFPeA	ug/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFHxA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFHpA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFOA	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	-
	PFNA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFDcA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFUnA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFDoA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFTrDA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	PFTeDA	µg/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	4:2 FTS	ug/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	6:2 FTS	µg/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	8:2 FTS	µg/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	10:2 FTS	µg/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	MeFOSAA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	EtFOSAA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	FOSA	µg/L	0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	-
	N-Et-FOSA	µg/L	0.005	<0.05	<0.05	<0.05	0.25	<0.05	<0.005	-
	N-Me-FOSA	µg/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	N-Et-FOSE	µg/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
	Sum of PFAS	µg/L	0.002	<0.01	<0.01	<0.01	0.25	<0.01	<0.002	-
	N-MeFOSE (24448-09-7)	ug/L	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	-
TRH	C6-C10 fraction	µg/L	20	-	-	-	-	-	-	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	-	-	-	-	-	-	<20
MAH	Benzene	µg/L	1	-	-	-	-	-	-	<1
	Toluene	µg/L	2	-	-	-	-	-	-	<2
	Ethylbenzene	µg/L	2	-	-	-	-	-	-	<2
	m&p-Xylene	µg/L	2	-	-	-	-	-	-	<2
	o-Xylene	µg/L	2	-	-	-	-	-	-	<2
	Total Xylenes	µg/L	2	-	-	-	-	-	-	<2
	Total BTEX	µg/L	1	-	-	-	-	-	-	<1
	Naphthalene (VOC)	µg/L	5	-	-	-	-	-	-	<5
Alkalinity	Bicarbonate Alkalinity as CaCO3	mg/L	1	-	-	-	-	-	2	-
	Carbonate Alkalinity as CaCO3	mg/L	1	-	-	-	-	-	<1	-
	Hydroxide Alkalinity as CaCO3	mg/L	1	-	-	-	-	-	<1	-
	Total Alkalinity as CaCO3	mg/L	1	-	-	-	-	-	2	-
	Hardness as CaCO3 (Filtered)	mg/L		-	-	-	-	-	<1	-
Nutrients	Reactive Phosphorus (as P)	mg/L	0.01	-	-	-	-	-	<0.01	-
Major Ions	Chloride	mg/L	1	-	-	-	-	-	<1	-
	Calcium	mg/L	1	-	-	-	-	-	<1	-
	Fluoride	mg/L	0.1	-	-	-	-	-	<0.1	-
	Magnesium	mg/L	1	-	-	-	-	-	<1	-
	Potassium	mg/L	1	-	-	-	-	-	<1	-
	Sodium	mg/L	1	-	-	-	-	-	<1	-
	Total Anions	meq/L	0.01	-	-	-	-	-	0.04	-
	Total Cations	meq/L	0.01	-	-	-	-	-	<0.01	-
	Sulfate (as SO4-) (Filtered)	mg/L		-	-	-	-	-	<1	-

Appendix H

Analytical Laboratory Reports

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AECOM
OFFICE:
PROJECT: 60597459
ORDER NUMBER:
PROJECT MANAGER: James Peachey
CONTACT PH:
SAMPLER: Camden McCosker
SAMPLER MOBILE: 0499 990 214
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com
Email Invoice to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com

TURNAROUND REQUIREMENTS :
(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☑ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)
COC: [✓ 1] 2 3 4 5 6 7
OF: 1 2 3 4 [✓ 5] 6 7

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Camden	Dan		
DATE/TIME:	DATE/TIME: 7/6/19 9.00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231X-LL ~~EP231~~ (PFAS 28 ~~suite~~) Low Level	NT-1D (Cations - Ca/Mg/Na/K/hardness)	NT-2A Anions	HCO3	FO4 EK071G		W-5 (TRH/BTEXN/8 Metals)	W-18 (TRH C6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	GW05_190604	6/6/19	W	2P	2	✓	✓	✓	✓	✓	✓				
2	GW09-190604	11	11	11	2	✓	✓	✓	✓	✓	✓				
3	GW10-190604	11	11	11	2	✓	✓	✓	✓	✓	✓				
4	GW02-190605	5/6/19	11	2P	2	✓	✓	✓	✓	✓	✓				
5	GW03-190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
6	CA08-190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
7	MW05-190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
8	CA01-190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
9	CA03-190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
10	GW04-190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
11	GW04A_190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
12	GW07_190605	↓	↓	↓	11	✓	✓	✓	✓	✓	✓				
				TOTAL											

Environmental Division
Brisbane
Work Order Reference
EB1914865

Telephone : + 61-7-3243 7222

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
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☐MACKAY 78 Harbour Road Mackay QLD 4740
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☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

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

CLIENT: AECOM
OFFICE: Brisbane
PROJECT: 60597459
ORDER NUMBER:
PROJECT MANAGER: James Peachey
CONTACT PH:
SAMPLER: Camden McCosker
SAMPLER MOBILE: 0499 990 214
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com
Email Invoice to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)
COC: 1 [✓ 2] 3 4 5 6 7
OF: 1 2 3 4 [✓ 5] 6 7

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Camden	Dan		
DATE/TIME:	DATE/TIME: 7/6/19 9:00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-ST (PFAS 28 super trace)	NT-1D (Cations - Ca/Mg/Na/K/hardness)	NT-2A Anions	HCO3	PO4	F	W-5 (TRH/BTEXN/8 Metals)	W-18 (TRH C6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	SW03_190604	4/6/19	W	2P	2	✓	✓	✓	✓	✓	✓				
14	SW04_190604	〃	W	〃	2	✓	✓	✓	✓	✓	✓				
15	SW07-190605	5/6/19	W	SVOC 2P, 2VOC, 1metals	5	✓	✓	✓	✓	✓	✓	✓			
16	SW0dA-190605	↓	↓	〃	5	✓	✓	✓	✓	✓	✓	✓			
17	SW09-190605			〃	5	✓	✓	✓	✓	✓	✓	✓			2x extra SVOC bottles for internal QC
18	SW06 - 190605			〃	5	✓	✓	✓	✓	✓	✓	✓			
19	SW05 - 190605			2P	2	✓	✓	✓	✓	✓	✓				
20	SW01-190605			2P	2	✓	✓	✓	✓	✓	✓				
21	SW02-190605	↓	↓	2P	2	✓	✓	✓	✓	✓	✓				
TOTAL															

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

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

CLIENT: AECOM

OFFICE: Brisbane

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Camden McCosker

SAMPLER MOBILE: 0499 990 214

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com

Email Invoice to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com

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

☑ Standard TAT **(List due date):**

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: 1 2 [✓ 3] 4 5 6 7

OF: 1 2 3 4 [✓ 5] 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Camden	DAN		
DATE/TIME:	DATE/TIME: 7/6/19 9.00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-X (PFAS 28)	NT-1S (Cations - Ca/Mg/Na/K)	NT-2S (Anions (Cl/SO4))	HCO3	PO4	F	S-5 (TRGH/BTEXN/8 Metals)	S-18 (TRH c6-C10/BTEXN)	~~BTEXN~~ HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
22	SS03-190604	4/6/19	S	1P, 1G	2	✓	✓	✓	✓	✓	✓				
23	SS04-190604	"	"	"	2	✓	✓	✓	✓	✓	✓				
24	SS07-190605	5/6/19	S	1P, 1G	2	✓	✓	✓	✓	✓	✓	✓			
25	SS08-190605	↓	↓	"	2	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~		✓	HOLD
26	SS09-190605			"	2	✓	✓	✓	✓	✓	✓	✓			
27	SS06-190605			"	2	✓	✓	✓	✓	✓	✓	✓			
28	SS08A-190605			"	2	✓	✓	✓	✓	✓	✓	✓			
29	SS05-190605			"	2	✓	✓	✓	✓	✓	✓				
30	SS01-190605			"	2	✓	✓	✓	✓	✓	✓				
31	SS02-190605	↓	↓	"	2	✓	✓	✓	✓	✓	✓				
				TOTAL											

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

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

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

☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com

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

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

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

CLIENT: AECOM

OFFICE: Brisbane

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey **CONTACT PH:**

SAMPLER: Camden McCosker **SAMPLER MOBILE:** 0499 990 214

COC emailed to ALS? (YES / NO) **EDD FORMAT (or default):**

Email Reports to (will default to PM if no other addresses are listed): **Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com**

Email Invoice to (will default to PM if no other addresses are listed): **Ona.Kanas@aecom.com; james.peachey@aecom.com**

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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

☑ Standard TAT **(List due date):**

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 [✓ 4] 5 6 7

OF: 1 2 3 4 [✓ 5] 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Camden	Dan		
DATE/TIME:	DATE/TIME: 7/6/19 9:00	DATE/TIME:	DATE/TIME:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231x-LL ~~EP231ST~~ (PFAS 28 ~~super~~ Lowlevel)	NT-1D (Cations - Ca/Mg/Na/K/hardness)	NT-2A Anions	HCO3	PO4	EP231-X PFAS 28	W-5 (TRH/BTEXN/8 Metals)	W-18 (TRH C6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
32	QC102-190605	5/6/19	W	1P	1	✓									
33	QC103-190605	↓	↓	11	1	✓									
34	QC106-190605	↓	↓	11	1	✓									
35	QC105-190605	↓	↓	1 metals 1 VOC 2VOC	4							✓			
36	QC303-190605	↓	↓	1P	1						✓				
37	QC304-190605	↓	↓	1P	1						✓				
38	QC401-190605	↓	↓	2VOC	2								✓		
				TOTAL											

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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AECOM

OFFICE: Brisbane

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Camden McCosker

SAMPLER MOBILE: 0499 990 214

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FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Camden	Dan		
DATE/TIME:	DATE/TIME: 7/6/19 9.00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-X (PFAS 28)	NT-1S (Cations - Ca/Mg/Na/K)	NT-2S (Anions (Cl/SO4))	HCO3	PO4	F	S-5 (TRGH/BTEXN/8 Metals)	S-18 (TRH c6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
39	QC104-190605	5/6/19	S	1P	1	✓									
40	QC400-190605	11	11	11	1									✓	
				TOTAL											

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

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EB1914865**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: james.peachey@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: 60597459	Page	: 1 of 6
Order number	:	Quote number	: EP2016AECOMAU0014 (EN/096/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CAMDEN McCOSKER		

Dates

Date Samples Received	: 07-Jun-2019 09:00	Issue Date	: 13-Jun-2019
Client Requested Due Date	: 14-Jun-2019	Scheduled Reporting Date	: **19-Jun-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 4.1/5.0/0.5°C - Ice present
Receipt Detail	: MEDIUM HARD ESKY	No. of samples received / analysed	: 40 / 39

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised, Analysis has been removed from samples “SS01” and ”SS02” as an extra container was received with sample “SS01” and a container is missing for “SS02”. If you wish to discuss this please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, Fluoride analysis has been removed from all samples as the chain of custody does not specify whether Soluble or Total Fluoride is required. If you wish to discuss this please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, Where “HCO3” and “F” have been requested on the provide chain of custody, alkalinity as Calcium Bicarbonate and Soluble fluoride are provided in the NT-01D and NT-1D packages. If Total fluoride is required instead please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- **As per email from James Peachey, The orange glass jars for samples SS01 and SS02 were identified using PFAS containers and matching the soil types in each jar. If this is incorrect please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- **As per email from James Peachey, Soluble Fluoride is required for soil samples not total. If this is incorrect please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- **13/6/19: SRN has been resent to acknowledge that all samples with the SW Suffix has had Super trace PFAS added. Turn-around has been adjusted to allow for reporting of the Super trace PFAS the new date is the 19/6/19. For any further information regarding these adjustments please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EB1914865-022	04-Jun-2019 00:00	SS03_190604	✓	✓
EB1914865-023	04-Jun-2019 00:00	SS04_190604	✓	✓
EB1914865-024	05-Jun-2019 00:00	SS07_190605	✓	✓
EB1914865-026	05-Jun-2019 00:00	SS09_190605	✓	✓
EB1914865-027	05-Jun-2019 00:00	SS06_190605	✓	✓
EB1914865-028	05-Jun-2019 00:00	SS08A_190605	✓	✓
EB1914865-029	05-Jun-2019 00:00	SS05_190605	✓	✓
EB1914865-030	05-Jun-2019 00:00	SS01_190605	✓	✓
EB1914865-031	05-Jun-2019 00:00	SS02_190605	✓	✓
EB1914865-039	05-Jun-2019 00:00	QC104_190605	✓	✓
EB1914865-040	05-Jun-2019 00:00	QC400_190605	✓	

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - ED037 Alkalinity in Soil	SOIL - EK040S Fluoride Soluble	SOIL - EK071G (solids) Reactive Phosphorus as P By Discrete	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)	SOIL - NT-2S Major Anions (Cl, SO4)	SOIL - S-05 TRH/BTEXN/8 Metals
EB1914865-022	04-Jun-2019 00:00	SS03_190604		✓	✓	✓	✓	✓	
EB1914865-023	04-Jun-2019 00:00	SS04_190604		✓	✓	✓	✓	✓	
EB1914865-024	05-Jun-2019 00:00	SS07_190605		✓	✓	✓	✓	✓	✓
EB1914865-025	05-Jun-2019 00:00	SS08_190605	✓						
EB1914865-026	05-Jun-2019 00:00	SS09_190605		✓	✓	✓	✓	✓	✓
EB1914865-027	05-Jun-2019 00:00	SS06_190605		✓	✓	✓	✓	✓	✓
EB1914865-028	05-Jun-2019 00:00	SS08A_190605		✓	✓	✓	✓	✓	✓
EB1914865-029	05-Jun-2019 00:00	SS05_190605		✓	✓	✓	✓	✓	
EB1914865-030	05-Jun-2019 00:00	SS01_190605		✓	✓	✓	✓	✓	
EB1914865-031	05-Jun-2019 00:00	SS02_190605		✓	✓	✓	✓	✓	

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - S-18 TRH(C6-C9)/BTEXN
EB1914865-040	05-Jun-2019 00:00	QC400_190605	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EK071G Reactive Phosphorus by Discrete analyser	WATER - EP231X-LL (EB) PFAS - Full Suite Low Level (28 analytes)	WATER - EP231X-ST PFAS - Super Trace Waters Long Suite (28	WATER - NT-01D & 02A Major Cations & Anions (Ca, Mg, Na, K, Cl, SO4,	WATER - W-05T TRH/BTEXN/8 Metals (Total)
EB1914865-001	04-Jun-2019 00:00	GW05_190604	✓	✓		✓	
EB1914865-002	04-Jun-2019 00:00	GW09_190604	✓	✓		✓	
EB1914865-003	04-Jun-2019 00:00	GW10_190604	✓	✓		✓	
EB1914865-004	05-Jun-2019 00:00	GW02_190605	✓	✓		✓	
EB1914865-005	05-Jun-2019 00:00	GW03_190605	✓	✓		✓	
EB1914865-006	05-Jun-2019 00:00	CA08_190605	✓	✓		✓	
EB1914865-007	05-Jun-2019 00:00	MW05_190605	✓	✓		✓	
EB1914865-008	05-Jun-2019 00:00	CA01_190605	✓	✓		✓	
EB1914865-009	05-Jun-2019 00:00	CA03_190605	✓	✓		✓	
EB1914865-010	05-Jun-2019 00:00	GW04_190605	✓	✓		✓	
EB1914865-011	05-Jun-2019 00:00	GW08A_190605	✓	✓		✓	
EB1914865-012	05-Jun-2019 00:00	GW07_190605	✓	✓		✓	
EB1914865-013	04-Jun-2019 00:00	SW03_190604	✓		✓	✓	
EB1914865-014	04-Jun-2019 00:00	SW04_190604	✓		✓	✓	
EB1914865-015	05-Jun-2019 00:00	SW07_190605	✓		✓	✓	✓
EB1914865-016	05-Jun-2019 00:00	SW08A_190605	✓		✓	✓	✓
EB1914865-017	05-Jun-2019 00:00	SW09_190605	✓		✓	✓	✓
EB1914865-018	05-Jun-2019 00:00	SW06_190605	✓		✓	✓	✓
EB1914865-019	05-Jun-2019 00:00	SW05_190605	✓		✓	✓	
EB1914865-020	05-Jun-2019 00:00	SW01_190605	✓		✓	✓	
EB1914865-021	05-Jun-2019 00:00	SW02_190605	✓		✓	✓	
EB1914865-032	05-Jun-2019 00:00	QC102_190605		✓			
EB1914865-033	05-Jun-2019 00:00	QC103_190605		✓			
EB1914865-034	05-Jun-2019 00:00	QC106_190605		✓			
EB1914865-035	05-Jun-2019 00:00	QC105_190605					✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - W-18 TRH(C6 - C9)/BTEXN
EB1914865-036	05-Jun-2019 00:00	QC303_190605	✓	
EB1914865-037	05-Jun-2019 00:00	QC304_190605	✓	
EB1914865-038	05-Jun-2019 00:00	QC401_190605		✓

Proactive Holding Time Report

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

Matrix: **SOIL**

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

Method				**Samples Received**		**Instructions Received**	
Client Sample ID(s)	**Container**	**Due for extraction**	**Due for analysis**	**Date**	**Evaluation**	**Date**	**Evaluation**
EK040S: Fluoride - Soluble							
SS03_190604	Soil Glass Jar - Unpreserved	11-Jun-2019	11-Jul-2019	07-Jun-2019	✓	12-Jun-2019	✗
SS04_190604	Soil Glass Jar - Unpreserved	11-Jun-2019	11-Jul-2019	07-Jun-2019	✓	12-Jun-2019	✗

Matrix: **WATER**

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

Method				**Samples Received**		**Instructions Received**	
Client Sample ID(s)	**Container**	**Due for extraction**	**Due for analysis**	**Date**	**Evaluation**	**Date**	**Evaluation**
ED093F: Major Cations - Dissolved							
GW05_190604	Clear Plastic Bottle - Natural	----	11-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW09_190604	Clear Plastic Bottle - Natural	----	11-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW10_190604	Clear Plastic Bottle - Natural	----	11-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW03_190604	Clear Plastic Bottle - Natural	----	11-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW04_190604	Clear Plastic Bottle - Natural	----	11-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
EK071G: Reactive Phosphorus as P-By Discrete Analyser							
CA01_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
CA03_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
CA08_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW02_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW03_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW04_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW05_190604	Clear Plastic Bottle - Natural	----	06-Jun-2019	07-Jun-2019	✗	12-Jun-2019	✗
GW07_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW08A_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
GW09_190604	Clear Plastic Bottle - Natural	----	06-Jun-2019	07-Jun-2019	✗	12-Jun-2019	✗
GW10_190604	Clear Plastic Bottle - Natural	----	06-Jun-2019	07-Jun-2019	✗	12-Jun-2019	✗
MW05_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW01_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW02_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW03_190604	Clear Plastic Bottle - Natural	----	06-Jun-2019	07-Jun-2019	✗	12-Jun-2019	✗
SW04_190604	Clear Plastic Bottle - Natural	----	06-Jun-2019	07-Jun-2019	✗	12-Jun-2019	✗
SW05_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW06_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW07_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW08A_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗
SW09_190605	Clear Plastic Bottle - Natural	----	07-Jun-2019	07-Jun-2019	✓	12-Jun-2019	✗

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CAMDEN McCOSKER

- *AU Certificate of Analysis - NATA (COA)	Email	camden.mccosker@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	camden.mccosker@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	camden.mccosker@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	camden.mccosker@aecom.com
- Chain of Custody (CoC) (COC)	Email	camden.mccosker@aecom.com
- Chromatogram (CHROM)	Email	camden.mccosker@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	camden.mccosker@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	camden.mccosker@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	camden.mccosker@aecom.com
- EDI Format - XTab (XTAB)	Email	camden.mccosker@aecom.com

JAMES PEACHEY

- *AU Certificate of Analysis - NATA (COA)	Email	james.peachey@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	james.peachey@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	james.peachey@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	james.peachey@aecom.com
- Chain of Custody (CoC) (COC)	Email	james.peachey@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	james.peachey@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	james.peachey@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	james.peachey@aecom.com
- EDI Format - XTab (XTAB)	Email	james.peachey@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	james.peachey@aecom.com

ONA KANAS

- *AU Certificate of Analysis - NATA (COA)	Email	ona.kanas@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ona.kanas@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ona.kanas@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ona.kanas@aecom.com
- Chain of Custody (CoC) (COC)	Email	ona.kanas@aecom.com
- Chromatogram (CHROM)	Email	ona.kanas@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	ona.kanas@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	ona.kanas@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	ona.kanas@aecom.com
- EDI Format - XTab (XTAB)	Email	ona.kanas@aecom.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1914865**	Page	: 1 of 37
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: 60597459	Date Samples Received	: 07-Jun-2019 09:00
Order number	: 60597459	Date Analysis Commenced	: 10-Jun-2019
C-O-C number	: ----	Issue Date	: 19-Jun-2019 20:29
Sampler	: CAMDEN McCOSKER		
Site	: ----		
Quote number	: EN/096/18		
No. of samples received	: 40		
No. of samples analysed	: 39		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Franco Lentini		Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- EP071: Sample SW09_190605 shows poor matrix spike recovery. Insufficient sample for re-extraction and re-analysis.
- EP231X: Sample 'SS04_190604' shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.
- EP080: The LOR for sample 'SS09_190605' has been raised due to high moisture content.
- EK071G (Reactive Phosphorus as P): The LOR has been raised for some samples due to high moisture content.
- ED037 (Alkalinity): NATA accreditation does not cover the performance of this service.
- EP231X-ST: LOR raised for analytes Perfluoroheptane sulfonic acid (PFHpS) and Perfluoroheptanoic acid (PFHpA) on sample EB1914865_015 due to matrix interferences.
- EP231X-LL: Particular samples required dilution prior to extraction due to matrix interferences. LOR values have been adjusted accordingly.
- EP080: Poor matrix spike recovery due to high moisture content.
- EP231X: Poor surrogate recovery for sample 'SS03_190604' due to matrix interference. Confirmed by surrogate result of its duplicate.
- EP231X: Certain LOR values have been raised for particular samples due to high moisture content.
- EP231X: The LOR of PFBA has been raised for particular samples due to matrix interference.
- EP231X: Particular samples show poor surrogate recovery due to matrix interference. Confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

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

			Client sample ID	**SS03_190604**	**SS04_190604**	**SS07_190605**	**SS09_190605**	**SS06_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-022**	**EB1914865-023**	**EB1914865-024**	**EB1914865-026**	**EB1914865-027**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**37.5**	**50.6**	**31.0**	**84.6**	**70.8**
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**44**	**26**	**9**	**70**	**79**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**44**	**26**	**9**	**70**	**79**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<5	<5	<5	<5	<5
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**1010**	**760**	**920**	**1020**	**610**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	**7000**	**3650**	**5840**	**9370**	**530**
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	**90**	**40**	**310**	**580**	**40**
Magnesium	7439-95-4	10	mg/kg	**260**	**110**	**450**	**920**	**20**
Sodium	7440-23-5	10	mg/kg	**3320**	**1860**	**2600**	**5200**	**710**
Potassium	7440-09-7	10	mg/kg	**260**	**140**	**100**	**380**	**110**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	**8**	**54**	**28**
Cadmium	7440-43-9	1	mg/kg	----	----	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	----	----	**19**	**11**	**24**
Copper	7440-50-8	5	mg/kg	----	----	**18**	**23**	**39**
Lead	7439-92-1	5	mg/kg	----	----	**15**	**14**	**22**
Nickel	7440-02-0	2	mg/kg	----	----	**19**	**62**	**15**
Zinc	7440-66-6	5	mg/kg	----	----	**62**	**431**	**107**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**5**	**2**	**1**	**4**	**7**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	<0.1	**0.2**	**0.2**	<0.2	**3.0**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	<50	**120**	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	<100	**530**	**120**
C29 - C36 Fraction	----	100	mg/kg	----	----	**160**	**660**	**250**
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	----	----	**160**	**1310**	**370**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS03_190604**	**SS04_190604**	**SS07_190605**	**SS09_190605**	**SS06_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-022**	**EB1914865-023**	**EB1914865-024**	**EB1914865-026**	**EB1914865-027**
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	----	----	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	<50	**130**	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	**110**	**970**	**260**
>C34 - C40 Fraction	----	100	mg/kg	----	----	**110**	**420**	**200**
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	----	----	**220**	**1520**	**460**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	----	----	<50	**130**	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	<0.2	<0.5	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	<0.5	<1.0	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	----	----	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0139**	**0.0033**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0138**	**0.0087**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	**0.0002**	**0.0006**	**0.0999**	**0.194**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0066**	**0.0188**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0017**	**0.0060**	**0.0033**	**0.317**	**1.60**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0010**	**0.0035**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.003	**0.002**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0108**	**0.0057**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0295**	**0.0158**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS03_190604**	**SS04_190604**	**SS07_190605**	**SS09_190605**	**SS06_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-022**	**EB1914865-023**	**EB1914865-024**	**EB1914865-026**	**EB1914865-027**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0089**	**0.0060**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	**0.0004**	<0.0002	**0.0098**	**0.0249**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0014**	**0.0090**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	**0.0005**	<0.0002	**0.0008**	**0.0028**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0010**	**0.0018**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0010**	**0.0020**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0002**	**0.0003**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0006	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0014**	**0.0022**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0006	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0006	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0006	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0006	<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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS03_190604**	**SS04_190604**	**SS07_190605**	**SS09_190605**	**SS06_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-022**	**EB1914865-023**	**EB1914865-024**	**EB1914865-026**	**EB1914865-027**
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
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	**0.0017**	**0.0056**	**0.0039**	**0.517**	**1.90**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0017**	**0.0047**	**0.0039**	**0.417**	**1.79**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0017**	**0.0051**	**0.0039**	**0.490**	**1.85**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	**80.4**	**75.1**	**68.9**
Toluene-D8	2037-26-5	0.2	%	----	----	**88.1**	**80.1**	**78.0**
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	**91.6**	**91.6**	**81.7**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**58.5**	**73.0**	**79.0**	**73.0**	**69.0**
13C8-PFOA	----	0.0002	%	**64.5**	**77.5**	**85.5**	**79.0**	**84.0**

Analytical Results

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

			Client sample ID	**SS08A_190605**	**SS05_190605**	**SS01_190605**	**SS02_190605**	**QC104_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-028**	**EB1914865-029**	**EB1914865-030**	**EB1914865-031**	**EB1914865-039**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**----**	**----**	**----**	**----**	**85.7**
Moisture Content	----	1.0	%	**25.3**	**80.8**	**34.1**	**40.6**	**----**
ED037: Alkalinity								
Total Alkalinity as CaCO3	----	1	mg/kg	**26**	**52**	**770**	**1790**	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	**26**	**52**	**770**	**1790**	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<5	<5	<5	<5	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	**80**	**1190**	**1210**	**1670**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	**490**	**5210**	**9070**	**10300**	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	**510**	**120**	**140**	----
Magnesium	7439-95-4	10	mg/kg	<10	**760**	**420**	**440**	----
Sodium	7440-23-5	10	mg/kg	**330**	**2860**	**4760**	**6200**	----
Potassium	7440-09-7	10	mg/kg	**20**	**450**	**330**	**450**	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**6**	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**17**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**71**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**33**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**8**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**131**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.4**	----	----	----	----
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**1**	**3**	**3**	**6**	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	**2.4**	<0.2	<0.1	<0.1	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**140**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS08A_190605**	**SS05_190605**	**SS01_190605**	**SS02_190605**	**QC104_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-028**	**EB1914865-029**	**EB1914865-030**	**EB1914865-031**	**EB1914865-039**
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**140**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**140**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	**110**	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**250**	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	**0.0016**	<0.0002	<0.0002	**0.0116**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	**0.0027**	<0.0002	<0.0002	**0.0150**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	**0.0177**	<0.0002	<0.0002	**0.113**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	**0.0024**	<0.0002	<0.0002	**0.0082**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0024**	**0.178**	**0.0008**	**0.0004**	**0.331**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	**0.0009**	**0.0004**	<0.0002	<0.0002	**0.0004**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.003

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**SS08A_190605**	**SS05_190605**	**SS01_190605**	**SS02_190605**	**QC104_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-028**	**EB1914865-029**	**EB1914865-030**	**EB1914865-031**	**EB1914865-039**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0002**	**0.0016**	<0.0002	<0.0002	**0.0113**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0002**	**0.0036**	<0.0002	<0.0002	**0.0296**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	**0.0007**	<0.0002	<0.0002	**0.0091**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	**0.0026**	<0.0002	<0.0002	**0.0108**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	**0.0012**	<0.0002	<0.0002	**0.0020**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	**0.0004**	**0.0011**	<0.0002	<0.0002	**0.0009**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	**0.0009**	<0.0002	<0.0002	**0.0008**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	**0.0002**	**0.0008**	<0.0002	<0.0002	**0.0006**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0006	<0.0005	<0.0005	<0.0006
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	**0.0013**	<0.0002	<0.0002	**0.0010**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0006	<0.0005	<0.0005	<0.0006
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0006	<0.0005	<0.0005	<0.0006
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0006	<0.0005	<0.0005	<0.0006
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0006	<0.0005	<0.0005	<0.0006
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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS08A_190605**	**SS05_190605**	**SS01_190605**	**SS02_190605**	**QC104_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-028**	**EB1914865-029**	**EB1914865-030**	**EB1914865-031**	**EB1914865-039**
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	**0.0011**	<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	**0.0043**	**0.218**	**0.0008**	**0.0004**	**0.546**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0024**	**0.196**	**0.0008**	**0.0004**	**0.444**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0028**	**0.207**	**0.0008**	**0.0004**	**0.516**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**76.0**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**79.9**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**88.7**	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**87.0**	**27.0**	**101**	**117**	**81.5**
13C8-PFOA	----	0.0002	%	**87.0**	**35.0**	**110**	**118**	**81.0**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**QC400_190605**	----	----	----	----
			Client sampling date / time	05-Jun-2019 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-040**	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**16.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**88.6**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**95.9**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**99.7**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**GW05_190604**	**GW09_190604**	**GW10_190604**	**GW02_190605**	**GW03_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-001**	**EB1914865-002**	**EB1914865-003**	**EB1914865-004**	**EB1914865-005**
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**133**	**10**	**14**	**552**	**946**
Total Alkalinity as CaCO3	----	1	mg/L	**133**	**10**	**14**	**552**	**946**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**621**	**7**	**18**	**563**	**6460**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**130**	**14**	**39**	**8060**	**22600**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**49**	**2**	**3**	**251**	**785**
Magnesium	7439-95-4	1	mg/L	**92**	**2**	**5**	**531**	**2220**
Sodium	7440-23-5	1	mg/L	**196**	**12**	**29**	**5380**	**15900**
Potassium	7440-09-7	1	mg/L	**36**	**3**	**4**	**193**	**563**
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**501**	**13**	**28**	**2810**	**11100**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.2**	<0.1	**0.2**	**1.0**	**0.6**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	**0.02**	**0.04**	**0.47**
EN055: Ionic Balance								
ø **Total Anions**	----	0.01	meq/L	**19.2**	**0.74**	**1.75**	**250**	**791**
ø **Total Cations**	----	0.01	meq/L	**19.5**	**0.86**	**1.92**	**295**	**928**
ø **Ionic Balance**	----	0.01	%	**0.54**	**----**	**----**	**8.26**	**7.97**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	**9.64**	**0.262**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	**9.13**	**0.140**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	**0.005**	<0.002	**0.007**	**51.7**	**0.260**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	**7.38**	**0.003**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	<0.002	**0.018**	**70.0**	**0.034**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GW05_190604**	**GW09_190604**	**GW10_190604**	**GW02_190605**	**GW03_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-001**	**EB1914865-002**	**EB1914865-003**	**EB1914865-004**	**EB1914865-005**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.010	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	**1.62**	**0.10**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	**6.57**	**0.228**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	<0.002	**18.9**	**0.872**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	**3.78**	**0.029**
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	**0.006**	**5.66**	**0.009**
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	**0.153**	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	**0.040**	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.010	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.010	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.010	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.025	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	**0.053**	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.025	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.025	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.025	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.025	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.010	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.010	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GW05_190604**	**GW09_190604**	**GW10_190604**	**GW02_190605**	**GW03_190605**
			Client sampling date / time	04-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-001**	**EB1914865-002**	**EB1914865-003**	**EB1914865-004**	**EB1914865-005**
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.010	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	**0.157**	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	**0.554**	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.010	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	**0.005**	<0.002	**0.031**	**185**	**1.94**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	**0.005**	<0.002	**0.025**	**122**	**0.294**
Sum of PFAS (WA DER List)	----	0.002	µg/L	**0.005**	<0.002	**0.031**	**168**	**1.79**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	**83.7**	**78.9**	**99.5**	**95.4**	**89.8**
13C8-PFOA	----	0.002	%	**88.3**	**89.7**	**99.5**	**93.2**	**97.0**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**CA08_190605**	**MW05_190605**	**CA01_190605**	**CA03_190605**	**GW04_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-006**	**EB1914865-007**	**EB1914865-008**	**EB1914865-009**	**EB1914865-010**
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**32**	**28**	**21**	**68**	**108**
Total Alkalinity as CaCO3	----	1	mg/L	**32**	**28**	**21**	**68**	**108**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**5**	**6**	**8**	**31**	**69**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**10**	**10**	**9**	**366**	**15**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**7**	**6**	**4**	**50**	**48**
Magnesium	7439-95-4	1	mg/L	**2**	**2**	**2**	**24**	**11**
Sodium	7440-23-5	1	mg/L	**11**	**11**	**11**	**158**	**19**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**2**	**13**	**11**
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**26**	**23**	**18**	**224**	**165**
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	**0.2**	<0.1
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.17**	**0.03**	<0.01	<0.01	**0.13**
EN055: Ionic Balance								
ø **Total Anions**	----	0.01	meq/L	**1.02**	**0.97**	**0.84**	**12.3**	**4.02**
ø **Total Cations**	----	0.01	meq/L	**1.04**	**0.99**	**0.89**	**11.7**	**4.41**
ø **Ionic Balance**	----	0.01	%	**----**	**----**	**----**	**2.72**	**4.64**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	**0.005**	**0.260**	**2.22**	**0.990**	**0.003**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	**0.007**	**0.302**	**1.57**	**1.44**	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	**0.107**	**1.52**	**4.07**	**13.2**	**0.021**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	**0.004**	**0.162**	**0.350**	**1.14**	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	**0.158**	**4.27**	**12.1**	**33.6**	**0.005**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**CA08_190605**	**MW05_190605**	**CA01_190605**	**CA03_190605**	**GW04_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-006**	**EB1914865-007**	**EB1914865-008**	**EB1914865-009**	**EB1914865-010**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	**0.007**	<0.010	<0.010	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	**0.12**	**0.59**	**0.16**	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	**0.007**	**0.193**	**1.17**	**1.10**	<0.002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	**0.022**	**0.630**	**3.87**	**3.86**	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	**0.009**	**0.115**	**0.373**	**1.08**	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	**0.030**	**0.210**	**0.480**	**1.79**	<0.002
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	**0.002**	**0.013**	**0.018**	**0.175**	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	**0.003**	<0.002	<0.010	**0.040**	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.010	<0.010	<0.002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.010	<0.010	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.010	<0.010	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.025	<0.025	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	**0.022**	<0.010	<0.010	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.025	<0.025	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.025	<0.025	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.025	<0.025	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.025	<0.025	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.010	<0.010	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.010	<0.010	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**CA08_190605**	**MW05_190605**	**CA01_190605**	**CA03_190605**	**GW04_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-006**	**EB1914865-007**	**EB1914865-008**	**EB1914865-009**	**EB1914865-010**
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.010	<0.010	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	**0.025**	<0.010	<0.010	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	**0.013**	**0.024**	**0.040**	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.010	<0.010	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	**0.354**	**7.86**	**26.8**	**58.6**	**0.029**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	**0.265**	**5.79**	**16.2**	**46.8**	**0.026**
Sum of PFAS (WA DER List)	----	0.002	µg/L	**0.338**	**8.01**	**24.9**	**55.8**	**0.029**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	**97.4**	**81.0**	**98.5**	**100**	**90.6**
13C8-PFOA	----	0.002	%	**95.0**	**88.7**	**94.9**	**95.8**	**84.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW08A_190605	GW07_190605	SW03_190604	SW04_190604	SW07_190605
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1914865-011	EB1914865-012	EB1914865-013	EB1914865-014	EB1914865-015
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**369**	**1210**	**168**	**49**	**424**
Total Alkalinity as CaCO3	----	1	mg/L	**369**	**1210**	**168**	**49**	**424**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**124**	**2340**	**1640**	**112**	**1980**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**793**	**22300**	**10900**	**747**	**14500**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**81**	**749**	**276**	**30**	**420**
Magnesium	7439-95-4	1	mg/L	**50**	**1920**	**795**	**46**	**1080**
Sodium	7440-23-5	1	mg/L	**500**	**14600**	**6880**	**425**	**9400**
Potassium	7440-09-7	1	mg/L	**23**	**532**	**245**	**24**	**306**
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**408**	**9780**	**3960**	**264**	**5500**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	**0.023**
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	**0.0010**
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	**0.020**
Copper	7440-50-8	0.001	mg/L	----	----	----	----	**0.089**
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	**0.063**
Lead	7439-92-1	0.001	mg/L	----	----	----	----	**0.052**
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	**0.726**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.9**	**0.6**	**0.1**	**0.7**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	**1.18**	<0.01	**0.03**	**0.01**
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**32.3**	**702**	**345**	**24.4**	**459**
ø Total Cations	----	0.01	meq/L	**30.5**	**844**	**385**	**24.4**	**526**
ø Ionic Balance	----	0.01	%	**2.91**	**9.19**	**5.45**	<0.01	**6.88**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**GW08A_190605**	**GW07_190605**	**SW03_190604**	**SW04_190604**	**SW07_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-011**	**EB1914865-012**	**EB1914865-013**	**EB1914865-014**	**EB1914865-015**
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	----	----	<20
C10 - C14 Fraction	----	50	µg/L	----	----	----	----	**110**
C15 - C28 Fraction	----	100	µg/L	----	----	----	----	**1480**
C29 - C36 Fraction	----	50	µg/L	----	----	----	----	**460**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	----	----	----	----	**2050**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	----	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	----	----	----	----	<20
>C10 - C16 Fraction	----	100	µg/L	----	----	----	----	**140**
>C16 - C34 Fraction	----	100	µg/L	----	----	----	----	**1780**
>C34 - C40 Fraction	----	100	µg/L	----	----	----	----	**310**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	----	----	----	----	**2230**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	----	----	----	----	**140**
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	----	----	<1
Toluene	108-88-3	2	µg/L	----	----	----	----	<2
Ethylbenzene	100-41-4	2	µg/L	----	----	----	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	----	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	----	----	<2
^ **Total Xylenes**	----	2	µg/L	----	----	----	----	<2
^ **Sum of BTEX**	----	1	µg/L	----	----	----	----	<1
Naphthalene	91-20-3	5	µg/L	----	----	----	----	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	----	----	**0.0024**	**0.0248**	**0.0141**
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	**0.019**	<0.002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	----	----	**0.0016**	**0.0121**	**0.0085**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	**0.017**	<0.002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	----	----	**0.0229**	**0.107**	**0.0374**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**GW08A_190605**	**GW07_190605**	**SW03_190604**	**SW04_190604**	**SW07_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-011**	**EB1914865-012**	**EB1914865-013**	**EB1914865-014**	**EB1914865-015**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	**0.212**	**0.004**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	----	----	<0.0005	**0.0068**	<0.0020
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	**0.013**	<0.002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	----	----	**0.0174**	**0.193**	**0.0134**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	**0.040**	**0.045**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	----	----	**0.006**	<0.002	<0.002
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	**0.03**	<0.01	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	----	----	**0.0009**	**0.0132**	**0.0158**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	**0.016**	<0.002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	----	----	**0.0074**	**0.0433**	**0.0038**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	**0.039**	<0.002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	----	----	**0.0007**	**0.0097**	<0.0020
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	**0.010**	<0.002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	----	----	**0.0023**	**0.0254**	**0.0180**
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	**0.020**	<0.002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	----	----	<0.0005	**0.0014**	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	----	----	<0.0005	**0.0016**	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GW08A_190605**	**GW07_190605**	**SW03_190604**	**SW04_190604**	**SW07_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-011**	**EB1914865-012**	**EB1914865-013**	**EB1914865-014**	**EB1914865-015**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	----	----	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	----	----	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	----	----	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	----	----	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GW08A_190605**	**GW07_190605**	**SW03_190604**	**SW04_190604**	**SW07_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-011**	**EB1914865-012**	**EB1914865-013**	**EB1914865-014**	**EB1914865-015**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	----	----	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	----	----	<0.001	<0.001	<0.001
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	----	----	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	----	----	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	----	----	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0003	µg/L	----	----	**0.0616**	**0.438**	**0.111**
Sum of PFAS	----	0.002	µg/L	**0.416**	**0.049**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0003	µg/L	----	----	**0.0403**	**0.300**	**0.0508**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	**0.252**	**0.049**	----	----	----
Sum of PFAS (WA DER List)	----	0.0003	µg/L	----	----	**0.0600**	**0.416**	**0.102**
Sum of PFAS (WA DER List)	----	0.002	µg/L	**0.386**	**0.049**	----	----	----
EP080S: TPH(V)/BTEX Surrogates								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**GW08A_190605**	**GW07_190605**	**SW03_190604**	**SW04_190604**	**SW07_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	04-Jun-2019 00:00	04-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-011**	**EB1914865-012**	**EB1914865-013**	**EB1914865-014**	**EB1914865-015**
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	----	**105**
Toluene-D8	2037-26-5	2	%	----	----	----	----	**103**
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	----	**115**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	----	----	**75.5**	**80.1**	**73.5**
13C4-PFOS	----	0.002	%	**93.0**	**82.2**	----	----	----
13C8-PFOA	----	0.0005	%	----	----	**96.1**	**96.8**	**103**
13C8-PFOA	----	0.002	%	**90.7**	**91.1**	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW08A_190605**	**SW09_190605**	**SW06_190605**	**SW05_190605**	**SW01_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-016**	**EB1914865-017**	**EB1914865-018**	**EB1914865-019**	**EB1914865-020**
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**56**	**16**	**18**	**25**	**121**
Total Alkalinity as CaCO3	----	1	mg/L	**56**	**16**	**18**	**25**	**121**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**73**	**138**	**136**	**142**	**3060**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**480**	**866**	**868**	**887**	**18800**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**21**	**39**	**40**	**46**	**478**
Magnesium	7439-95-4	1	mg/L	**26**	**53**	**52**	**54**	**1500**
Sodium	7440-23-5	1	mg/L	**270**	**471**	**465**	**472**	**12600**
Potassium	7440-09-7	1	mg/L	**21**	**21**	**21**	**22**	**459**
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**160**	**316**	**314**	**337**	**7370**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.010**	**0.001**	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	**0.0005**	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.003**	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.006**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.012**	**0.003**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	**0.004**	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	**0.022**	**0.092**	**0.007**	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.1**	**0.2**	**0.2**	**0.2**	**0.8**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.09**	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance								
ø **Total Anions**	----	0.01	meq/L	**16.2**	**27.6**	**27.7**	**28.5**	**596**
ø **Total Cations**	----	0.01	meq/L	**15.5**	**27.3**	**27.0**	**27.8**	**707**
ø **Ionic Balance**	----	0.01	%	**2.24**	**0.53**	**1.16**	**1.14**	**8.49**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW08A_190605**	**SW09_190605**	**SW06_190605**	**SW05_190605**	**SW01_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-016**	**EB1914865-017**	**EB1914865-018**	**EB1914865-019**	**EB1914865-020**
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	<100	**220**	**120**	----	----
C29 - C36 Fraction	----	50	µg/L	<50	**120**	**60**	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	<50	**340**	**180**	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	**300**	**150**	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	**110**	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	**410**	**150**	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L	<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	**0.0788**	**0.0766**	**0.141**	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	**0.0013**	**0.0864**	**0.0834**	**0.152**	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0153**	**0.824**	**0.802**	**1.26**	**0.0041**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	**0.0012**	**0.0754**	**0.0714**	**0.164**	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	**0.0469**	**2.21**	**1.97**	**4.25**	**0.0074**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW08A_190605**	**SW09_190605**	**SW06_190605**	**SW05_190605**	**SW01_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-016**	**EB1914865-017**	**EB1914865-018**	**EB1914865-019**	**EB1914865-020**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	**0.018**	**0.015**	**0.029**	<0.002
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.0085**	**0.0656**	**0.0572**	**0.104**	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.0110**	**0.205**	**0.182**	**0.321**	**0.0009**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.0026**	**0.0464**	**0.0402**	**0.0714**	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0111**	**0.108**	**0.110**	**0.165**	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0006**	**0.0102**	**0.0123**	**0.0170**	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	**0.0015**	**0.0024**	**0.0021**	**0.0088**	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	**0.0017**	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	**0.0015**	**0.0017**	**0.0065**	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW08A_190605**	**SW09_190605**	**SW06_190605**	**SW05_190605**	**SW01_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-016**	**EB1914865-017**	**EB1914865-018**	**EB1914865-019**	**EB1914865-020**
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	**0.003**	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	**0.002**	**0.001**	**0.012**	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums								
Sum of PFAS	----	0.0003	µg/L	**0.100**	**3.73**	**3.42**	**6.71**	**0.0124**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0003	µg/L	**0.0622**	**3.03**	**2.77**	**5.51**	**0.0115**
Sum of PFAS (WA DER List)	----	0.0003	µg/L	**0.0954**	**3.56**	**3.25**	**6.36**	**0.0124**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**90.9**	**89.9**	**91.9**	**----**	**----**
Toluene-D8	2037-26-5	2	%	**99.2**	**101**	**100**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%	**100**	**104**	**102**	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	**85.2**	**79.5**	**82.1**	**75.5**	**68.9**
13C8-PFOA	----	0.0005	%	**101**	**107**	**99.4**	**97.2**	**92.9**

Analytical Results

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

			Client sample ID	**SW02_190605**	**QC102_190605**	**QC103_190605**	**QC106_190605**	**QC105_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-021**	**EB1914865-032**	**EB1914865-033**	**EB1914865-034**	**EB1914865-035**
				Result	Result	Result	Result	Result
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	**162**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**162**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2290**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**14100**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**367**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1100**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**9370**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**348**	----	----	----	----
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**5450**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	**0.001**
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	<0.001
Copper	7440-50-8	0.001	mg/L	----	----	----	----	<0.001
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	**0.003**
Lead	7439-92-1	0.001	mg/L	----	----	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	**0.009**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.8**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	----	----	----	----
EN055: Ionic Balance								
ø **Total Anions**	----	0.01	meq/L	**449**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L	**525**	----	----	----	----
ø **Ionic Balance**	----	0.01	%	**7.87**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW02_190605**	**QC102_190605**	**QC103_190605**	**QC106_190605**	**QC105_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-021**	**EB1914865-032**	**EB1914865-033**	**EB1914865-034**	**EB1914865-035**
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	----	----	<20
C10 - C14 Fraction	----	50	µg/L	----	----	----	----	<50
C15 - C28 Fraction	----	100	µg/L	----	----	----	----	**120**
C29 - C36 Fraction	----	50	µg/L	----	----	----	----	**60**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	----	----	----	----	**180**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	----	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	----	----	----	----	<20
>C10 - C16 Fraction	----	100	µg/L	----	----	----	----	<100
>C16 - C34 Fraction	----	100	µg/L	----	----	----	----	**160**
>C34 - C40 Fraction	----	100	µg/L	----	----	----	----	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	----	----	----	----	**160**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	----	----	----	----	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	----	----	<1
Toluene	108-88-3	2	µg/L	----	----	----	----	<2
Ethylbenzene	100-41-4	2	µg/L	----	----	----	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	----	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	----	----	<2
^ **Total Xylenes**	----	2	µg/L	----	----	----	----	<2
^ **Sum of BTEX**	----	1	µg/L	----	----	----	----	<1
Naphthalene	91-20-3	5	µg/L	----	----	----	----	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0021**	----	----	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	----	**0.020**	**0.002**	**1.08**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	**0.0019**	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	----	**0.017**	<0.002	**1.51**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0117**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW02_190605**	**QC102_190605**	**QC103_190605**	**QC106_190605**	**QC105_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-021**	**EB1914865-032**	**EB1914865-033**	**EB1914865-034**	**EB1914865-035**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	----	**0.198**	**0.019**	**14.1**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	----	**0.013**	<0.002	**1.31**	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	**0.0061**	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	----	**0.036**	**0.004**	**36.6**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	----	<0.002	<0.002	<0.010	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	----	----	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	----	**0.02**	**0.01**	**0.16**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.0009**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	----	**0.014**	<0.002	**1.23**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.0038**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	----	**0.037**	<0.002	**4.26**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.0006**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	----	**0.009**	<0.002	**1.12**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0013**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	----	**0.019**	<0.002	**1.81**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	----	<0.002	<0.002	**0.192**	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	----	<0.002	<0.002	**0.038**	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	----	<0.002	<0.002	<0.010	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW02_190605**	**QC102_190605**	**QC103_190605**	**QC106_190605**	**QC105_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-021**	**EB1914865-032**	**EB1914865-033**	**EB1914865-034**	**EB1914865-035**
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	----	<0.002	<0.002	<0.010	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	----	<0.002	<0.002	<0.010	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	----	<0.005	<0.005	<0.025	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	----	----	----	----
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	----	<0.002	<0.002	<0.010	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	----	<0.005	<0.005	<0.025	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	----	<0.005	<0.005	<0.025	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	----	<0.005	<0.005	<0.025	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	----	<0.005	<0.005	<0.025	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW02_190605**	**QC102_190605**	**QC103_190605**	**QC106_190605**	**QC105_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-021**	**EB1914865-032**	**EB1914865-033**	**EB1914865-034**	**EB1914865-035**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	----	<0.002	<0.002	<0.010	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	----	<0.002	<0.002	<0.010	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	----	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	----	<0.005	<0.005	<0.010	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	----	<0.005	<0.005	<0.050	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	----	<0.005	<0.005	**0.033**	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	----	<0.005	<0.005	<0.010	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0003	µg/L	**0.0284**	----	----	----	----
Sum of PFAS	----	0.002	µg/L	----	**0.383**	**0.035**	**63.4**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0003	µg/L	**0.0178**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	----	**0.234**	**0.023**	**50.7**	----
Sum of PFAS (WA DER List)	----	0.0003	µg/L	**0.0265**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.002	µg/L	----	**0.353**	**0.035**	**60.4**	----
EP080S: TPH(V)/BTEX Surrogates								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW02_190605**	**QC102_190605**	**QC103_190605**	**QC106_190605**	**QC105_190605**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	**EB1914865-021**	**EB1914865-032**	**EB1914865-033**	**EB1914865-034**	**EB1914865-035**
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	----	**91.9**
Toluene-D8	2037-26-5	2	%	----	----	----	----	**102**
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	----	**99.6**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	**61.3**	----	----	----	----
13C4-PFOS	----	0.002	%	----	**71.7**	**87.0**	**94.1**	----
13C8-PFOA	----	0.0005	%	**60.2**	----	----	----	----
13C8-PFOA	----	0.002	%	----	**73.8**	**84.4**	**99.0**	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**QC303_190605**	**QC304_190605**	**QC401_190605**	**----**	**----**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914865-036**	**EB1914865-037**	**EB1914865-038**	**--------**	**--------**
				Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	----	----	<20	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	<1	----	----
Toluene	108-88-3	2	µg/L	----	----	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	----	----	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	----	----	<2	----	----
^ **Total Xylenes**	----	2	µg/L	----	----	<2	----	----
^ **Sum of BTEX**	----	1	µg/L	----	----	<1	----	----
Naphthalene	91-20-3	5	µg/L	----	----	<5	----	----
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	<0.02	<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	<0.01	<0.01	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QC303_190605	QC304_190605	QC401_190605	----	----
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	EB1914865-036	EB1914865-037	EB1914865-038	--------	--------
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
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	**0.25**	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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	**0.25**	<0.01	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**QC303_190605**	**QC304_190605**	**QC401_190605**	**----**	**----**
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	**EB1914865-036**	**EB1914865-037**	**EB1914865-038**	**--------**	**--------**
				Result	Result	Result	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	**92.3**	----	----
Toluene-D8	2037-26-5	2	%	----	----	**99.5**	----	----
4-Bromofluorobenzene	460-00-4	2	%	----	----	**100**	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**85.7**	**91.7**	----	----	----
13C8-PFOA	----	0.02	%	**85.7**	**87.0**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)* *Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	53	134
Toluene-D8	2037-26-5	60	131
4-Bromofluorobenzene	460-00-4	59	127
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130
13C8-PFOA	----	70	130

Sub-Matrix: **WATER**

Compound	*CAS Number*	*Recovery Limits (%)* *Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130
13C8-PFOA	----	70	130

Environmental

QUALITY CONTROL REPORT

Work Order : **EB1914865**

Client : **AECOM Australia Pty Ltd**
Contact : MR JAMES PEACHEY
Address :
Brisbane
Telephone : +61 07 3553 2000
Project : 60597459
Order number : 60597459
C-O-C number : ----
Sampler : CAMDEN McCOSKER
Site : ----
Quote number : EN/096/18
No. of samples received : 40
No. of samples analysed : 39

Page : 1 of 36

Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 07-Jun-2019
Date Analysis Commenced : 10-Jun-2019
Issue Date : 19-Jun-2019

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*
Franco Lentini		Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD

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 (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2396871)									
EB1914865-024	SS07_190605	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	21	8.69	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	19	19	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	18	18	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	17	17.4	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	62	62	0.00	0% - 50%
EB1914909-014	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	4	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	7	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	17	6.69	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	28	28	0.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2396654)									
EB1914865-022	SS03_190604	EA055: Moisture Content	----	0.1	%	37.5	37.3	0.318	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2396877)									
EB1914865-040	QC400_190605	EA055: Moisture Content	----	0.1	%	16.2	15.9	1.60	0% - 50%
EB1914909-007	Anonymous	EA055: Moisture Content	----	0.1	%	15.0	15.0	0.00	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2401754)									
EB1914865-030	SS01_190605	EA055: Moisture Content	----	0.1	%	34.1	35.2	2.97	0% - 20%
ED037: Alkalinity (QC Lot: 2396867)									
EB1914865-022	SS03_190604	ED037: Total Alkalinity as CaCO3	----	1	mg/kg	44	44	0.00	No Limit
		ED037: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	44	44	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 (%)
ED037: Alkalinity (QC Lot: 2396867) - continued									
EB1914865-022	SS03_190604	ED037: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<5	<5	0.00	No Limit
ED037: Alkalinity (QC Lot: 2401749)									
EB1914865-030	SS01_190605	ED037: Total Alkalinity as CaCO3	----	1	mg/kg	770	770	0.00	0% - 20%
		ED037: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/kg	770	770	0.00	0% - 20%
		ED037: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/kg	<5	<5	0.00	No Limit
ED040S: Soluble Major Anions (QC Lot: 2396865)									
EB1914878-001	Anonymous	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	10	10	0.00	No Limit
EB1914865-022	SS03_190604	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	1010	1020	1.16	0% - 20%
ED040S: Soluble Major Anions (QC Lot: 2401752)									
EB1914865-030	SS01_190605	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	1210	1240	2.36	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2396864)									
EB1914878-001	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	60	60	0.00	No Limit
EB1914865-022	SS03_190604	ED045G: Chloride	16887-00-6	10	mg/kg	7000	6960	0.514	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2401751)									
EB1914865-030	SS01_190605	ED045G: Chloride	16887-00-6	10	mg/kg	9070	9140	0.679	0% - 20%
ED093S: Soluble Major Cations (QC Lot: 2396866)									
EB1914865-022	SS03_190604	ED093S: Calcium	7440-70-2	10	mg/kg	90	90	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	260	270	0.00	0% - 20%
		ED093S: Sodium	7440-23-5	10	mg/kg	3320	3410	2.66	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	260	260	0.00	0% - 20%
ED093S: Soluble Major Cations (QC Lot: 2401750)									
EB1914865-030	SS01_190605	ED093S: Calcium	7440-70-2	10	mg/kg	120	130	0.00	0% - 50%
		ED093S: Magnesium	7439-95-4	10	mg/kg	420	440	3.94	0% - 20%
		ED093S: Sodium	7440-23-5	10	mg/kg	4760	5030	5.49	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	330	350	5.05	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2396870)									
EB1914865-024	SS07_190605	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB1914909-014	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EK040S: Fluoride Soluble (QC Lot: 2401748)									
EB1914865-022	SS03_190604	EK040S: Fluoride	16984-48-8	1	mg/kg	5	5	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2396868)									
EB1914865-022	SS03_190604	EK071G: Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2401753)									
EB1914865-030	SS01_190605	EK071G: Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2396874)									
EB1914865-024	SS07_190605	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2396875)									
EB1914865-024	SS07_190605	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	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 (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2396875) - continued									
EB1914865-024	SS07_190605	EP071: C29 - C36 Fraction	----	100	mg/kg	160	140	10.1	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2396874)									
EB1914865-024	SS07_190605	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2396875)									
EB1914865-024	SS07_190605	EP071: >C16 - C34 Fraction	----	100	mg/kg	110	100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	110	100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2396874)									
EB1914865-024	SS07_190605	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2396633)									
EB1914865-022	SS03_190604	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	0.0017	0.0018	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB1914887-003	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	<0.0002	<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: 2401736)									
EB1914865-030	SS01_190605	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	0.0008	0.0009	0.00	No Limit
		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: 2396633)									
EB1914865-022	SS03_190604	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: 2396633) - continued									
EB1914865-022	SS03_190604	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
EB1914887-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2401736)									
EB1914865-030	SS01_190605	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2396633)									
EB1914865-022	SS03_190604	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: 2396633) - continued									
EB1914865-022	SS03_190604	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)	24448-09-7	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
EB1914887-003	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)	24448-09-7	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: 2401736)									
EB1914865-030	SS01_190605	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)	24448-09-7	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: 2396633)									
EB1914865-022	SS03_190604	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2396633) - continued									
EB1914865-022	SS03_190604	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB1914887-003	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2401736)									
EB1914865-030	SS01_190605	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	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
ED037P: Alkalinity by PC Titrator (QC Lot: 2397039)									
EB1914865-001	GW05_190604	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	133	133	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	133	0.00	0% - 20%
EB1914865-011	GW08A_190605	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	369	369	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	369	369	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2397041)									
EB1914865-021	SW02_190605	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	162	158	3.16	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	162	158	3.16	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2396360)									
EB1914865-001	GW05_190604	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	621	620	0.244	0% - 20%
EB1914865-010	GW04_190605	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	69	70	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2396364)									
EB1914865-021	SW02_190605	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2290	2300	0.313	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 2396361)									
EB1914865-001	GW05_190604	ED045G: Chloride	16887-00-6	1	mg/L	130	133	2.53	0% - 20%
EB1914865-010	GW04_190605	ED045G: Chloride	16887-00-6	1	mg/L	15	15	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 2396363)									
EB1914865-021	SW02_190605	ED045G: Chloride	16887-00-6	1	mg/L	14100	14200	0.518	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2396535)									
EB1914137-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EB1914665-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	30	30	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	16	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	46	46	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2396536)									
EB1914865-005	GW03_190605	ED093F: Calcium	7440-70-2	1	mg/L	785	898	13.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2220	2210	0.361	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	15900	15900	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	563	571	1.47	0% - 20%
EB1914865-014	SW04_190604	ED093F: Calcium	7440-70-2	1	mg/L	30	30	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	46	46	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	425	411	3.16	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	24	24	0.00	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 2396610)									
EB1914807-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.044	0.030	36.6	No Limit
EB1914807-010	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.013	0.012	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.023	0.024	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2396615)									
EB1914865-015	SW07_190605	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	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 (%)*
EK040P: Fluoride by PC Titrator (QC Lot: 2397038)									
EB1914865-001	GW05_190604	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.2	1.2	0.00	0% - 50%
EB1914865-011	GW08A_190605	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2397040)									
EB1914865-021	SW02_190605	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.8	0.8	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2396362)									
EB1914865-001	GW05_190604	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB1914865-010	GW04_190605	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.13	0.13	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2396365)									
EB1914865-021	SW02_190605	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2396702)									
EB1914429-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EB1914717-008	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	730	700	3.93	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2398088)									
EB1914865-017	SW09_190605	EP071: C15 - C28 Fraction	----	100	µg/L	220	170	24.8	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	120	100	21.7	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2396702)									
EB1914429-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EB1914717-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	850	810	4.54	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2398088)									
EB1914865-017	SW09_190605	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	300	240	22.3	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	110	<100	11.1	No Limit
EP080: BTEXN (QC Lot: 2396702)									
EB1914429-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EB1914717-008	Anonymous	EP080: Benzene	71-43-2	1	µg/L	378	370	1.88	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	88	83	5.87	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	79	76	4.16	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2396638)									
EB1914812-012	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.10	<0.10	0.00	No Limit
EB1914812-022	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.02	<0.02	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: 2396640)									
EB1914865-001	GW05_190604	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.005	0.005	0.00	No Limit
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EB1914865-011	GW08A_190605	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.019	0.018	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.017	0.016	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.212	0.214	0.704	0% - 20%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	0.013	0.014	0.00	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.040	0.039	3.02	0% - 20%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2397114)									
EB1914865-020	SW01_190605	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.004	0.004	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 (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2397114) - continued									
EB1914865-020	SW01_190605	EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.004	0.004	0.00	No Limit
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2410819)									
ES1917574-001	Anonymous	EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	0.0009	0.0014	45.6	No Limit
		EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0016	0.0016	0.00	No Limit
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
ES1917574-003	Anonymous	EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	0.0228	0.0214	6.43	0% - 20%
		EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0032	0.0030	6.54	No Limit
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	0.0026	0.0025	5.45	No Limit
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0137	0.0136	0.00	0% - 20%
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	0.0014	0.0014	0.00	No Limit
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2396638)									
EB1914812-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.10	<0.10	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: 2396638) - continued									
EB1914812-012	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.5	<0.5	0.00	No Limit
EB1914812-022	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (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: 2396640)									
EB1914865-001	GW05_190604	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EB1914865-011	GW08A_190605	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.016	0.015	0.00	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.039	0.038	3.37	0% - 50%
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.010	0.010	0.00	No Limit
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.020	0.020	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	0.03	0.03	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2397114)									
EB1914865-020	SW01_190605	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	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: 2397114) - continued									
EB1914865-020	SW01_190605	EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2410819)									
ES1917574-001	Anonymous	EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
ES1917574-003	Anonymous	EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0011	0.0012	0.00	No Limit
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0034	0.0033	2.98	No Limit
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0009	0.0009	0.00	No Limit
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0015	0.0014	0.00	No Limit
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2396638)									
EB1914812-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.10	<0.10	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: 2396638) - continued									
EB1914812-012	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.25	<0.25	0.00	No Limit
EB1914812-022	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)	24448-09-7	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: 2396640)									
EB1914865-001	GW05_190604	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1914865-011	GW08A_190605	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	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: 2396640) - continued									
EB1914865-011	GW08A_190605	EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2397114)									
EB1914865-020	SW01_190605	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2410819)									
ES1917574-001	Anonymous	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
ES1917574-003	Anonymous	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2410819) - continued									
ES1917574-003	Anonymous	EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2396638)									
EB1914812-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.10	<0.10	0.00	No Limit
EB1914812-022	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: 2396640)									
EB1914865-001	GW05_190604	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1914865-011	GW08A_190605	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	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: 2396640) - continued									
EB1914865-011	GW08A_190605	EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2397114)									
EB1914865-020	SW01_190605	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2410819)									
ES1917574-001	Anonymous	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.00	No Limit
ES1917574-003	Anonymous	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2396638)									
EB1914812-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.10	<0.10	0.00	No Limit
EB1914812-022	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	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 (%)
EP231P: PFAS Sums (QC Lot: 2396640)									
EB1914865-001	GW05_190604	EP231X-LL: Sum of PFAS	----	0.002	µg/L	0.005	0.005	0.00	No Limit
		EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.005	0.005	0.00	No Limit
		EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	0.005	0.005	0.00	No Limit
EB1914865-011	GW08A_190605	EP231X-LL: Sum of PFAS	----	0.002	µg/L	0.416	0.414	0.482	0% - 20%
		EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.252	0.253	0.396	0% - 20%
		EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	0.386	0.384	0.519	0% - 20%
EP231P: PFAS Sums (QC Lot: 2397114)									
EB1914865-020	SW01_190605	EP231X-LL: Sum of PFAS	----	0.002	µg/L	0.008	0.008	0.00	No Limit
		EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.008	0.008	0.00	No Limit
		EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	0.008	0.008	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2410819)									
ES1917574-001	Anonymous	EP231X-ST: Sum of PFAS	----	0.0003	µg/L	0.0025	0.0030	18.2	0% - 50%
ES1917574-003	Anonymous	EP231X-ST: Sum of PFAS	----	0.0003	µg/L	0.0506	0.0487	3.83	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
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2396871)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	98 mg/kg	102	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
EG005T: Chromium	7440-47-3	2	mg/kg	<2	15.4 mg/kg	118	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	48 mg/kg	104	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	50 mg/kg	104	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	12.4 mg/kg	111	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	115 mg/kg	96.9	87	127
ED037: Alkalinity (QCLot: 2396867)								
ED037: Total Alkalinity as CaCO3	----	----	mg/kg	----	500 mg/kg	98.7	93	103
ED037: Alkalinity (QCLot: 2401749)								
ED037: Total Alkalinity as CaCO3	----	----	mg/kg	----	500 mg/kg	99.8	93	103
ED040S: Soluble Major Anions (QCLot: 2396865)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	97.9	90	114
ED040S: Soluble Major Anions (QCLot: 2401752)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	102	90	114
ED045G: Chloride by Discrete Analyser (QCLot: 2396864)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	96.4	83	119
				<10	5000 mg/kg	101	83	119
ED045G: Chloride by Discrete Analyser (QCLot: 2401751)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	92.7	83	119
				<10	5000 mg/kg	102	83	119
ED093S: Soluble Major Cations (QCLot: 2396866)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	95.2	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	100	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	90.6	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	95.6	80	120
ED093S: Soluble Major Cations (QCLot: 2401750)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	97.8	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	99.4	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	103	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	93.7	80	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2396870)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.0847 mg/kg	90.3	70	130

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
EK040S: Fluoride Soluble (QCLot: 2401748)								
EK040S: Fluoride	16984-48-8	1	mg/kg	<1	25 mg/kg	101	84	122
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2396868)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	<0.1	2.5 mg/kg	97.9	89	115
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2401753)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.1	mg/kg	<0.1	2.5 mg/kg	97.5	89	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2396874)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	16 mg/kg	98.2	60	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2396875)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	310 mg/kg	104	79	123
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	490 mg/kg	110	77	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396874)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	18.5 mg/kg	99.7	58	124
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396875)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	450 mg/kg	106	81	122
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	320 mg/kg	111	74	122
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080: BTEXN (QCLot: 2396874)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	101	67	115
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	94.3	69	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.7	69	116
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	96.5	70	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	97.1	72	116
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.1	73	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2396633)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	79.5	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00117 mg/kg	70.9	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	76.3	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	76.5	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	79.3	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	72.9	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2401736)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	108	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00117 mg/kg	104	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	106	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	92.0	54	123

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*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2401736) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	102	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	96.7	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2396633)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	66.8	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.8	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.4	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.6	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.8	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	76.0	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2401736)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	81.8	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.2	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396633)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	68.1	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	66.0	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.0	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	70.5	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	55	130

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*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2401736)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.9	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.4	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	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: 2396633)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00116 mg/kg	85.8	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	75.8	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00119 mg/kg	81.5	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	79.6	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2401736)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00116 mg/kg	101	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	108	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00119 mg/kg	101	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	97.1	60	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
ED037P: Alkalinity by PC Titrator (QCLot: 2397039)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	98.9	80	120
ED037P: Alkalinity by PC Titrator (QCLot: 2397041)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.5	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2396360)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	85	118
				<1	100 mg/L	99.2	85	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2396364)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	85	118
				<1	100 mg/L	97.7	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 2396361)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.2	90	115
				<1	1000 mg/L	104	90	115
ED045G: Chloride by Discrete Analyser (QCLot: 2396363)								

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
ED045G: Chloride by Discrete Analyser (QCLot: 2396363) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	90	115
				<1	1000 mg/L	103	90	115
ED093F: Dissolved Major Cations (QCLot: 2396535)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 2396536)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 2396610)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.0	88	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.5	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.2	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	96.8	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	89	112
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.8	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	92.0	84	114
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2396615)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	100	84	118
EK040P: Fluoride by PC Titrator (QCLot: 2397038)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	100	80	117
EK040P: Fluoride by PC Titrator (QCLot: 2397040)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	104	80	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2396362)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	94.2	88	115
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2396365)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.6	88	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2396702)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	160 µg/L	105	67	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2398088)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	90.9	65	135
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	89.4	62	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396702)								

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396702) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	185 µg/L	105	66	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2398088)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	91.3	66	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	91.0	61	139
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN (QCLot: 2396702)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	100	73	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	100	75	119
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	98.7	73	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	99.1	77	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	102	76	121
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	89.8	75	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2396638)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.442 µg/L	95.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.469 µg/L	96.6	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.473 µg/L	92.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.476 µg/L	100	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.464 µg/L	99.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.482 µg/L	100	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2396640)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0442 µg/L	113	50	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0469 µg/L	113	50	130
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0473 µg/L	99.6	50	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0476 µg/L	101	50	130
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0464 µg/L	85.6	50	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0482 µg/L	72.8	40	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2397114)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0442 µg/L	94.8	50	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0469 µg/L	94.4	50	130
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0473 µg/L	76.3	50	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0476 µg/L	81.9	50	130
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0464 µg/L	61.8	50	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0482 µg/L	60.4	40	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2410819)								
EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.01 µg/L	113	50	130
EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.01 µg/L	120	50	130
EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.01 µg/L	112	50	130
EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.01 µg/L	119	50	130
EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	<0.0003	0.01 µg/L	115	50	130
EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.01 µg/L	116	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2396638)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.2	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	95.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	99.8	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	98.6	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	95.8	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.6	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	95.3	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2396640)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.25 µg/L	102	50	130
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	109	50	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	104	50	130
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	107	50	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	101	50	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	95.6	50	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	81.6	50	130
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	78.0	40	130
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	74.8	40	130
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	127	40	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	102	40	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2397114)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.25 µg/L	77.5	50	130
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	84.8	50	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	82.0	50	130
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	82.0	50	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	80.4	50	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	71.4	50	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	60.4	50	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2397114) - continued								
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	55.2	40	130
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	58.8	40	130
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	84.4	40	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	70.3	40	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2410819)								
EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	0.05 µg/L	92.2	30	130
EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.01 µg/L	117	50	130
EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.01 µg/L	122	50	130
EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.01 µg/L	124	50	130
EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.01 µg/L	127	50	130
EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.01 µg/L	123	50	130
EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.01 µg/L	111	50	130
EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	99.2	40	130
EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.01 µg/L	78.6	40	130
EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	43.4	40	130
EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.025 µg/L	66.3	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396638)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	94.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	95.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	96.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	91.0	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	89.4	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396640)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	73.6	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	72.9	40	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	72.5	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.125 µg/L	97.5	50	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	73.5	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	73.4	50	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396640) - continued								
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	75.6	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2397114)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	56.0	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	57.0	40	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	49.7	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.125 µg/L	61.1	50	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	47.0	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	53.6	50	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	52.8	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2410819)								
EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.01 µg/L	90.0	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.025 µg/L	55.5	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.025 µg/L	48.6	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.025 µg/L	62.9	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.025 µg/L	64.0	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.01 µg/L	68.6	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.01 µg/L	58.6	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2396638)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.467 µg/L	115	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.474 µg/L	110	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.479 µg/L	107	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.482 µg/L	97.7	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2396640)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0467 µg/L	104	50	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0474 µg/L	125	50	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.0479 µg/L	96.6	50	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0482 µg/L	89.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2397114)								

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2397114) - continued								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0467 µg/L	83.1	50	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0474 µg/L	94.5	50	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.0479 µg/L	77.2	50	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0482 µg/L	83.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2410819)								
EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.01 µg/L	124	50	130
EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.01 µg/L	120	50	130
EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.01 µg/L	125	50	130
EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.01 µg/L	108	50	130
EP231P: PFAS Sums (QCLot: 2396638)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 2396640)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----
EP231P: PFAS Sums (QCLot: 2397114)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----
EP231P: PFAS Sums (QCLot: 2410819)								
EP231X-ST: Sum of PFAS	----	0.0003	µg/L	<0.0003	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2396871)							
EB1914865-026	SS09_190605	EG005T: Arsenic	7440-38-2	50 mg/kg	85.8	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	86.5	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	86.4	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2396871) - continued							
EB1914865-026	SS09_190605	EG005T: Copper	7440-50-8	50 mg/kg	89.5	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	86.8	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	85.1	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	78.2	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2396870)							
EB1914865-026	SS09_190605	EG035T: Mercury	7439-97-6	5 mg/kg	101	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2396868)							
EB1914865-023	SS04_190604	EK071G: Reactive Phosphorus as P	14265-44-2	2 mg/kg	112	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2401753)							
EB1914865-031	SS02_190605	EK071G: Reactive Phosphorus as P	14265-44-2	2 mg/kg	95.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2396874)							
EB1914865-026	SS09_190605	EP080: C6 - C9 Fraction	----	8 mg/kg	# 62.9	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2396875)							
EB1914865-026	SS09_190605	EP071: C10 - C14 Fraction	----	310 mg/kg	112	70	130
		EP071: C15 - C28 Fraction	----	490 mg/kg	120	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396874)							
EB1914865-026	SS09_190605	EP080: C6 - C10 Fraction	C6_C10	8 mg/kg	# 63.9	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396875)							
EB1914865-026	SS09_190605	EP071: >C10 - C16 Fraction	----	450 mg/kg	116	70	130
		EP071: >C16 - C34 Fraction	----	320 mg/kg	119	70	130
EP080: BTEXN (QCLot: 2396874)							
EB1914865-026	SS09_190605	EP080: Benzene	71-43-2	2 mg/kg	# 66.9	70	130
		EP080: Toluene	108-88-3	2 mg/kg	# 66.0	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2396633)							
EB1914865-023	SS04_190604	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	61.6	57	121
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	67.2	55	125
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	63.2	52	126
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	68.0	54	123
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	55	127
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	58.4	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2401736)							
EB1914865-031	SS02_190605	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	99.6	57	121
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	102	55	125
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	92.4	52	126
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	84.4	54	123

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*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2401736) - continued							
EB1914865-031	SS02_190605	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.3	55	127
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	83.2	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2396633)							
EB1914865-023	SS04_190604	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	# 48.6	52	128
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	66.0	54	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	68.0	58	127
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	65.2	57	128
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	65.2	60	134
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	64.8	63	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	58.8	55	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	69.6	62	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	68.4	53	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	50.0	49	129
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	61.7	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2401736)							
EB1914865-031	SS02_190605	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	77.7	52	128
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	104	54	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	110	58	127
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	104	57	128
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	106	60	134
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	102	63	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	94.0	55	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	99.2	62	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	95.2	53	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	76.4	49	129
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	92.0	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396633)							
EB1914865-023	SS04_190604	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	62.0	52	132
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	82.7	65	126
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	69.2	64	126
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	72.4	63	124
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	60.4	58	125
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	78.4	61	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	66.0	55	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: 2401736)							
EB1914865-031	SS02_190605	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	108	52	132
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	90.2	65	126
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	94.6	64	126
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	86.2	63	124
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	90.2	58	125
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	115	61	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	103	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2396633)							
EB1914865-023	SS04_190604	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	68.4	54	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	80.4	61	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	72.4	62	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	68.0	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2401736)							
EB1914865-031	SS02_190605	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	94.8	54	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	101	61	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	97.6	62	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	90.0	60	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2396360)							
EB1914865-002	GW09_190604	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	107	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2396361)							
EB1914865-002	GW09_190604	ED045G: Chloride	16887-00-6	400 mg/L	117	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2396610)							
EB1914807-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	95.5	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.4	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.9	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	95.8	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	88.7	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	92.5	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2396615)							
EB1914865-016	SW08A_190605	EG035T: Mercury	7439-97-6	0.01 mg/L	97.8	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2397038)							
EB1914865-002	GW09_190604	EK040P: Fluoride	16984-48-8	5 mg/L	97.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2396362)							
EB1914865-002	GW09_190604	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	91.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2396702)							
EB1914429-002	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	94.9	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2398088)							
EB1914865-017	SW09_190605	EP071: C10 - C14 Fraction	----	1070 µg/L	# 39.8	49	134
		EP071: C15 - C28 Fraction	----	1770 µg/L	78.1	50	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2396702)							
EB1914429-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	98.4	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2398088)							
EB1914865-017	SW09_190605	EP071: >C10 - C16 Fraction	----	1560 µg/L	# 40.6	43	119
		EP071: >C16 - C34 Fraction	----	1190 µg/L	114	38	114
EP080: BTEXN (QCLot: 2396702)							
EB1914429-002	Anonymous	EP080: Benzene	71-43-2	10 µg/L	113	70	130
		EP080: Toluene	108-88-3	10 µg/L	106	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2396638)							
EB1914812-013	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	91.2	70	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	97.4	70	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	93.6	70	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	98.8	70	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	90.8	70	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	86.8	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2396640)							
EB1914865-002	GW09_190604	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.05 µg/L	79.0	50	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.05 µg/L	83.4	50	130
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.05 µg/L	74.2	50	130
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.05 µg/L	79.4	50	130
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.05 µg/L	71.0	50	130
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.05 µg/L	50.8	40	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2397114)							
EB1914865-021	SW02_190605	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.05 µg/L	77.6	50	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.05 µg/L	82.0	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: 2397114) - continued							
EB1914865-021	SW02_190605	EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.05 µg/L	69.4	50	130
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.05 µg/L	81.6	50	130
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.05 µg/L	60.4	50	130
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.05 µg/L	47.8	40	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2410819)							
ES1917574-002	Anonymous	EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.01 µg/L	101	50	130
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.01 µg/L	107	50	130
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01 µg/L	93.6	50	130
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.01 µg/L	104	50	130
		EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01 µg/L	109	50	130
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.01 µg/L	77.0	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2396638)							
EB1914812-013	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	88.4	70	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	98.6	70	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	97.4	70	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	95.8	70	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	100	70	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	98.2	70	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	97.4	70	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	99.4	70	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	96.0	70	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	106	70	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	94.5	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2396640)							
EB1914865-002	GW09_190604	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	77.5	50	130
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	83.2	50	130
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	77.8	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	82.0	50	130
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.05 µg/L	77.4	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	76.6	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	65.6	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	60.8	40	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	67.0	40	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	121	40	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	80.3	40	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2397114)							
EB1914865-021	SW02_190605	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	50.8	50	130
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	79.8	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*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2397114) - continued							
EB1914865-021	SW02_190605	EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	73.0	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	75.6	50	130
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.05 µg/L	77.8	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	75.2	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	61.2	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	56.0	40	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	56.8	40	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	85.8	40	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	53.5	40	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2410819)							
ES1917574-002	Anonymous	EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.05 µg/L	84.8	30	130
		EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.01 µg/L	113	50	130
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.01 µg/L	108	50	130
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.01 µg/L	116	50	130
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.01 µg/L	114	50	130
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.01 µg/L	111	50	130
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.01 µg/L	95.4	50	130
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.01 µg/L	69.8	30	130
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.01 µg/L	54.8	30	130
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01 µg/L	37.2	30	130
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.025 µg/L	68.9	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396638)							
EB1914812-013	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	98.6	70	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	97.4	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	94.4	70	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	92.6	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	93.5	70	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	105	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	93.4	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2396640)							
EB1914865-002	GW09_190604	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	58.0	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	59.4	40	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: 2396640) - continued							
EB1914865-002	GW09_190604	EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	58.5	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.125 µg/L	64.3	50	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	55.4	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	57.2	50	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	53.8	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2397114)							
EB1914865-021	SW02_190605	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	50.6	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	50.3	40	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	41.8	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.125 µg/L	53.2	50	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	41.2	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	50.0	50	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	49.8	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2410819)							
ES1917574-002	Anonymous	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.01 µg/L	78.2	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.025 µg/L	51.0	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.025 µg/L	41.4	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.025 µg/L	47.0	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.025 µg/L	53.7	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.01 µg/L	45.2	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.01 µg/L	48.8	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2396638)							

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2396638) - continued							
EB1914812-013	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	107	70	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	109	70	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	104	70	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	86.4	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2396640)							
EB1914865-002	GW09_190604	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	76.8	50	130
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	86.6	50	130
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	73.4	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	60.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2397114)							
EB1914865-021	SW02_190605	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	73.2	50	130
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	86.8	50	130
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	72.6	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	58.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2410819)							
ES1917574-002	Anonymous	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.01 µg/L	110	50	130
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.01 µg/L	104	50	130
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.01 µg/L	110	50	130
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.01 µg/L	80.2	50	130

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1914865**	Page	: 1 of 20
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Telephone	: +61 7 3552 8616
Project	: 60597459	Date Samples Received	: 07-Jun-2019
Site	: ----	Issue Date	: 19-Jun-2019
Sampler	: CAMDEN McCOSKER	No. of samples received	: 40
Order number	: 60597459	No. of samples analysed	: 39

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.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
EP080/071: Total Petroleum Hydrocarbons	EB1914865--026	SS09_190605	**C6 - C9 Fraction**	----	62.9 %	70-130%	**Recovery less than lower data quality objective**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EB1914865--026	SS09_190605	**C6 - C10 Fraction**	C6_C10	63.9 %	70-130%	**Recovery less than lower data quality objective**
EP080: BTEXN	EB1914865--026	SS09_190605	**Benzene**	71-43-2	66.9 %	70-130%	**Recovery less than lower data quality objective**
EP080: BTEXN	EB1914865--026	SS09_190605	**Toluene**	108-88-3	66.0 %	70-130%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EB1914865--023	SS04_190604	**Perfluorobutanoic acid (PFBA)**	375-22-4	48.6 %	52-128%	**Recovery less than lower data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
EP080/071: Total Petroleum Hydrocarbons	EB1914865--017	SW09_190605	**C10 - C14 Fraction**	----	39.8 %	49-134%	**Recovery less than lower data quality objective**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EB1914865--017	SW09_190605	**>C10 - C16 Fraction**	----	40.6 %	43-119%	**Recovery less than lower data quality objective**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Samples Submitted							
EP231S: PFAS Surrogate	EB1914865-022	SS03_190604	**13C4-PFOS**	----	58.5 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1914865-027	SS06_190605	**13C4-PFOS**	----	69.0 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1914865-029	SS05_190605	**13C4-PFOS**	----	27.0 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1914865-022	SS03_190604	**13C8-PFOA**	----	64.5 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1914865-029	SS05_190605	**13C8-PFOA**	----	35.0 %	70-130 %	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)	*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EK040S: Fluoride Soluble						

Matrix: **SOIL**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EK040S: Fluoride Soluble - Analysis Holding Time Compliance							
Soil Glass Jar - Unpreserved							
SS03_190604,	SS04_190604	13-Jun-2019	11-Jun-2019	**2**	----	----	----
Soil Glass Jar - Unpreserved							
SS07_190605, SS06_190605, SS05_190605, SS02_190605	SS09_190605, SS08A_190605, SS01_190605,	13-Jun-2019	12-Jun-2019	**1**	----	----	----

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural							
GW05_190604, GW10_190604, SW04_190604	GW09_190604, SW03_190604,	----	----	----	10-Jun-2019	06-Jun-2019	**4**
Clear Plastic Bottle - Natural							
GW02_190605, CA08_190605, CA01_190605, GW04_190605, GW07_190605, SW08A_190605, SW06_190605, SW01_190605,	GW03_190605, MW05_190605, CA03_190605, GW08A_190605, SW07_190605, SW09_190605, SW05_190605, SW02_190605	----	----	----	10-Jun-2019	07-Jun-2019	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Chloride by Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) QC104_190605	**05-Jun-2019**	----	----	----	**11-Jun-2019**	19-Jun-2019	✓
Soil Glass Jar - Unpreserved (EA055) SS03_190604, SS04_190604	**04-Jun-2019**	----	----	----	**11-Jun-2019**	18-Jun-2019	✓
Soil Glass Jar - Unpreserved (EA055) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605, QC400_190605	**05-Jun-2019**	----	----	----	**11-Jun-2019**	19-Jun-2019	✓
Soil Glass Jar - Unpreserved (EA055) SS01_190605, SS02_190605	**05-Jun-2019**	----	----	----	**13-Jun-2019**	19-Jun-2019	✓
ED037: Alkalinity							
Soil Glass Jar - Unpreserved (ED037) SS03_190604, SS04_190604	**04-Jun-2019**	**12-Jun-2019**	01-Dec-2019	✓	**12-Jun-2019**	01-Dec-2019	✓
Soil Glass Jar - Unpreserved (ED037) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
Soil Glass Jar - Unpreserved (ED037) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	02-Dec-2019	✓
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040S) SS03_190604, SS04_190604	**04-Jun-2019**	**12-Jun-2019**	02-Jul-2019	✓	**13-Jun-2019**	10-Jul-2019	✓
Soil Glass Jar - Unpreserved (ED040S) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605	**05-Jun-2019**	**12-Jun-2019**	03-Jul-2019	✓	**13-Jun-2019**	10-Jul-2019	✓
Soil Glass Jar - Unpreserved (ED040S) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	03-Jul-2019	✓	**13-Jun-2019**	11-Jul-2019	✓

Matrix: **SOIL**

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

Method		*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)			*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED045G: Chloride by Discrete Analyser								
Soil Glass Jar - Unpreserved (ED045G) SS03_190604,	SS04_190604	**04-Jun-2019**	**12-Jun-2019**	02-Jul-2019	✓	**13-Jun-2019**	10-Jul-2019	✓
Soil Glass Jar - Unpreserved (ED045G) SS07_190605, SS06_190605, SS05_190605	SS09_190605, SS08A_190605,	**05-Jun-2019**	**12-Jun-2019**	03-Jul-2019	✓	**13-Jun-2019**	10-Jul-2019	✓
Soil Glass Jar - Unpreserved (ED045G) SS01_190605,	SS02_190605	**05-Jun-2019**	**13-Jun-2019**	03-Jul-2019	✓	**13-Jun-2019**	11-Jul-2019	✓
ED093S: Soluble Major Cations								
Soil Glass Jar - Unpreserved (ED093S) SS03_190604,	SS04_190604	**04-Jun-2019**	**12-Jun-2019**	01-Dec-2019	✓	**13-Jun-2019**	01-Dec-2019	✓
Soil Glass Jar - Unpreserved (ED093S) SS07_190605, SS06_190605, SS05_190605	SS09_190605, SS08A_190605,	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	02-Dec-2019	✓
Soil Glass Jar - Unpreserved (ED093S) SS01_190605,	SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	02-Dec-2019	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) SS07_190605, SS06_190605,	SS09_190605, SS08A_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	02-Dec-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) SS07_190605, SS06_190605,	SS09_190605, SS08A_190605	**05-Jun-2019**	**11-Jun-2019**	03-Jul-2019	✓	**14-Jun-2019**	03-Jul-2019	✓
EK040S: Fluoride Soluble								
Soil Glass Jar - Unpreserved (EK040S) SS03_190604,	SS04_190604	**04-Jun-2019**	**13-Jun-2019**	11-Jun-2019	×	**13-Jun-2019**	11-Jul-2019	✓
Soil Glass Jar - Unpreserved (EK040S) SS07_190605, SS06_190605, SS05_190605, SS02_190605	SS09_190605, SS08A_190605, SS01_190605,	**05-Jun-2019**	**13-Jun-2019**	12-Jun-2019	×	**13-Jun-2019**	11-Jul-2019	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Soil Glass Jar - Unpreserved (EK071G) SS03_190604,	SS04_190604	**04-Jun-2019**	**12-Jun-2019**	01-Dec-2019	✓	**13-Jun-2019**	01-Dec-2019	✓
Soil Glass Jar - Unpreserved (EK071G) SS07_190605, SS06_190605, SS05_190605	SS09_190605, SS08A_190605,	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	02-Dec-2019	✓
Soil Glass Jar - Unpreserved (EK071G) SS01_190605,	SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	02-Dec-2019	✓

Matrix: **SOIL**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, QC400_190605	**05-Jun-2019**	**11-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓
Soil Glass Jar - Unpreserved (EP071) SS07_190605, SS09_190605, SS06_190605, SS08A_190605	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**13-Jun-2019**	22-Jul-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, QC400_190605	**05-Jun-2019**	**11-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓
Soil Glass Jar - Unpreserved (EP071) SS07_190605, SS09_190605, SS06_190605, SS08A_190605	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**13-Jun-2019**	22-Jul-2019	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, QC400_190605	**05-Jun-2019**	**11-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS03_190604, SS04_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605, QC104_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	23-Jul-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS03_190604, SS04_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605, QC104_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	23-Jul-2019	✓

Matrix: **SOIL**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS03_190604, SS04_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605, QC104_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	23-Jul-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS03_190604, SS04_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605, QC104_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	23-Jul-2019	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS03_190604, SS04_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS07_190605, SS09_190605, SS06_190605, SS08A_190605, SS05_190605, QC104_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
HDPE Soil Jar (EP231X) SS01_190605, SS02_190605	**05-Jun-2019**	**13-Jun-2019**	02-Dec-2019	✓	**13-Jun-2019**	23-Jul-2019	✓

Matrix: **WATER**

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

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

Matrix: **WATER**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	----	----	----	**12-Jun-2019**	18-Jun-2019	✓
Clear Plastic Bottle - Natural (ED037-P) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	----	----	----	**12-Jun-2019**	19-Jun-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	----	----	----	**10-Jun-2019**	02-Jul-2019	✓
Clear Plastic Bottle - Natural (ED041G) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	----	----	----	**10-Jun-2019**	03-Jul-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	----	----	----	**10-Jun-2019**	02-Jul-2019	✓
Clear Plastic Bottle - Natural (ED045G) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	----	----	----	**10-Jun-2019**	03-Jul-2019	✓

Matrix: **WATER**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	**----**	----	----	**11-Jun-2019**	11-Jun-2019	✓
Clear Plastic Bottle - Natural (ED093F) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**----**	----	----	**11-Jun-2019**	12-Jun-2019	✓
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Natural (ED093F) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	**----**	----	----	**11-Jun-2019**	11-Jun-2019	✓
Clear Plastic Bottle - Natural (ED093F) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**----**	----	----	**11-Jun-2019**	12-Jun-2019	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605	**05-Jun-2019**	**----**	----	----	**12-Jun-2019**	03-Jul-2019	✓

Matrix: **WATER**

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

Method ***Container** / Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation* ***Date extracted***	 *Due for extraction*	 *Evaluation*	*Analysis* ***Date analysed***	 *Due for analysis*	 *Evaluation*
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	**----**	----	----	**12-Jun-2019**	02-Jul-2019	✓
Clear Plastic Bottle - Natural (EK040P) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**----**	----	----	**12-Jun-2019**	03-Jul-2019	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) GW05_190604, GW09_190604, GW10_190604, SW03_190604, SW04_190604	**04-Jun-2019**	**----**	----	----	**10-Jun-2019**	06-Jun-2019	✘
Clear Plastic Bottle - Natural (EK071G) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**----**	----	----	**10-Jun-2019**	07-Jun-2019	✘
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605	**05-Jun-2019**	**11-Jun-2019**	12-Jun-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605, QC401_190605	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓

Matrix: **WATER**

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

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605	**05-Jun-2019**	**11-Jun-2019**	12-Jun-2019	✓	**11-Jun-2019**	21-Jul-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605, QC401_190605	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, QC105_190605, QC401_190605	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL) GW05_190604, GW09_190604, GW10_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW03_190604, SW04_190604	**04-Jun-2019**	**18-Jun-2019**	01-Dec-2019	✓	**18-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-LL) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, QC102_190605, QC103_190605, QC106_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X) QC303_190605, QC304_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**18-Jun-2019**	02-Dec-2019	✓	**18-Jun-2019**	02-Dec-2019	✓

Matrix: **WATER**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-LL) GW05_190604, GW09_190604, GW10_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW03_190604, SW04_190604	**04-Jun-2019**	**18-Jun-2019**	01-Dec-2019	✓	**18-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-LL) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, QC102_190605, QC103_190605, QC106_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X) QC303_190605, QC304_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**18-Jun-2019**	02-Dec-2019	✓	**18-Jun-2019**	02-Dec-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL) GW05_190604, GW09_190604, GW10_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW03_190604, SW04_190604	**04-Jun-2019**	**18-Jun-2019**	01-Dec-2019	✓	**18-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-LL) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, QC102_190605, QC103_190605, QC106_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X) QC303_190605, QC304_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**18-Jun-2019**	02-Dec-2019	✓	**18-Jun-2019**	02-Dec-2019	✓

Matrix: **WATER**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container */ Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL) GW05_190604, GW09_190604, GW10_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW03_190604, SW04_190604	**04-Jun-2019**	**18-Jun-2019**	01-Dec-2019	✓	**18-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-LL) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, QC102_190605, QC103_190605, QC106_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X) QC303_190605, QC304_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**18-Jun-2019**	02-Dec-2019	✓	**18-Jun-2019**	02-Dec-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-LL) GW05_190604, GW09_190604, GW10_190604	**04-Jun-2019**	**11-Jun-2019**	01-Dec-2019	✓	**11-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW03_190604, SW04_190604	**04-Jun-2019**	**18-Jun-2019**	01-Dec-2019	✓	**18-Jun-2019**	01-Dec-2019	✓
HDPE (no PTFE) (EP231X-LL) GW02_190605, GW03_190605, CA08_190605, MW05_190605, CA01_190605, CA03_190605, GW04_190605, GW08A_190605, GW07_190605, QC102_190605, QC103_190605, QC106_190605	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X) QC303_190605, QC304_190605	**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
HDPE (no PTFE) (EP231X-ST) SW07_190605, SW08A_190605, SW09_190605, SW06_190605, SW05_190605, SW01_190605, SW02_190605	**05-Jun-2019**	**18-Jun-2019**	02-Dec-2019	✓	**18-Jun-2019**	02-Dec-2019	✓

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)							
Alkalinity in Soil	ED037	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	3	16	**18.75**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride - Soluble	EK040S	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	3	16	**18.75**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	4	30	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	17	**17.65**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity in Soil	ED037	2	9	**22.22**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	2	9	**22.22**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	4	16	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride - Soluble	EK040S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	2	16	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	9	**22.22**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	2	9	**22.22**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	2	16	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride - Soluble	EK040S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	2	16	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	9	**22.22**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	9	**22.22**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	8	**12.50**	**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	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	3	15	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	21	**19.05**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	21	**19.05**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Major Cations - Dissolved	ED093F	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	21	**4.76**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	21	**4.76**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	21	**4.76**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	21	**4.76**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Alkalinity in Soil	ED037	SOIL	In house: Referenced to APHA 2320 B Alkalinity is determined and reported on a 1:5 soil/water leach.
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-Cl- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride - Soluble	EK040S	SOIL	In house: Referenced to APHA 4500 F--C Soluble Fluoride is determined after a 1:5 soil/water extract using an ion selective electrode.
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	SOIL	In house: Referenced to APHA 4500 P-F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3) (
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Analytical Methods	Method	Matrix	Method Descriptions
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. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the libarated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by 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)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction and LC-Electrospray-MS-MS, Negative Mode using MRM. This method is targeted to pristine environmental and drinking waters reporting at sub-parts per trillion. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

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

☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com

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

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

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

CLIENT: AECOM

OFFICE:

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Max Setchfield.

SAMPLER MOBILE: 0439 743105

COC emailed to ALS? ([✓ YES] / NO)

EDD FORMAT (or default):

Email Reports to: Ona.Kanas@aecom.com; james.peachey@aecom.com; max.setchfield@aecom.com

Email Invoice to: Ona.Kanas@aecom.com; james.peachey@aecom.com

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

☒ Standard TAT (List due date):

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: [✓ 1] 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
MSetchfield.	Dan		
DATE/TIME: 12/6/19. 1430	DATE/TIME: 13/6/19 9.30	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231x (PFAS low level)	NT-1D (Cations - Ca/Mg/Na/K/hardness)	NT-2A Anions	HCO3	PO4	F	W-5 (TRH/BTEXN/8 Metals)	W-18 (TRH C6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	GW01_190612	12/6/19 1245	W	2P	2	X	X	X	X	X	X				
	GW06-190612	12/6/19 1400	↓	↓	2	X	X	X	X	X	X				
	QC305_190612	12/6/19	↓	↓	2	X	X	X	X	X	X				
					TOTAL										

Environmental Division
Brisbane
Work Order Reference
EB1915332

Telephone : + 61-7-3243 7222

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

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1915332**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: james.peachey@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: 60597459 1.0	Page	: 1 of 3
Order number	:	Quote number	: EB2017AECOMAU0014 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MAX SETCHFIELD		

Dates

Date Samples Received	: 13-Jun-2019 09:30	Issue Date	: 13-Jun-2019
Client Requested Due Date	: 20-Jun-2019	Scheduled Reporting Date	: **20-Jun-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: -2.0°C - Ice present
Receipt Detail	: SMALL ESKY	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
    - Sample Container(s)/Preservation Non-Compliances
    - Summary of Sample(s) and Requested Analysis
    - Proactive Holding Time Report
    - Requested Deliverables
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix**: WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EK071G Reactive Phosphorus by Discrete analyser	WATER - EP231X-LL (EB) PFAS - Full Suite Low Level (28 analytes)	WATER - NT-01D & 02A Major Cations & Anions (Ca, Mg, Na, K, Cl, SO4,
EB1915332-001	12-Jun-2019 12:45	GW01_190612	✓	✓	✓
EB1915332-002	12-Jun-2019 14:00	GW06_190612	✓	✓	✓
EB1915332-003	12-Jun-2019 00:00	QC305_190612	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

JAMES PEACHEY

- *AU Certificate of Analysis - NATA (COA)	Email	james.peachey@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	james.peachey@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	james.peachey@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	james.peachey@aecom.com
- A4 - AU Tax Invoice (INV)	Email	james.peachey@aecom.com
- Chain of Custody (CoC) (COC)	Email	james.peachey@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	james.peachey@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	james.peachey@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	james.peachey@aecom.com
- EDI Format - XTab (XTAB)	Email	james.peachey@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	james.peachey@aecom.com

MAX SETCHFIELD

- *AU Certificate of Analysis - NATA (COA)	Email	max.setchfield@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	max.setchfield@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	max.setchfield@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	max.setchfield@aecom.com
- Chain of Custody (CoC) (COC)	Email	max.setchfield@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	max.setchfield@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	max.setchfield@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	max.setchfield@aecom.com
- EDI Format - XTab (XTAB)	Email	max.setchfield@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	max.setchfield@aecom.com

ONA KANAS

- *AU Certificate of Analysis - NATA (COA)	Email	ona.kanas@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ona.kanas@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ona.kanas@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ona.kanas@aecom.com
- A4 - AU Tax Invoice (INV)	Email	ona.kanas@aecom.com
- Chain of Custody (CoC) (COC)	Email	ona.kanas@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	ona.kanas@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	ona.kanas@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	ona.kanas@aecom.com
- EDI Format - XTab (XTAB)	Email	ona.kanas@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	ona.kanas@aecom.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order : **EB1915332**
Client : **AECOM Australia Pty Ltd**
Contact : MR JAMES PEACHEY
Address :
Brisbane
Telephone : +61 07 3553 2000
Project : 60597459 1.0
Order number : 60597459 1.0
C-O-C number : ----
Sampler : MAX SETCHFIELD
Site : ----
Quote number : EN/004/16
No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 6
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 13-Jun-2019 09:30
Date Analysis Commenced : 14-Jun-2019
Issue Date : 20-Jun-2019 16:54

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)	*Client sample ID*			**GW01_190612**	**GW06_190612**	**QC305_190612**	**----**	**----**
	Client sampling date / time			12-Jun-2019 12:45	12-Jun-2019 14:00	12-Jun-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1915332-001**	**EB1915332-002**	**EB1915332-003**	**--------**	**--------**
				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**200**	**91**	**2**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**200**	**91**	**2**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	**348**	<1	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**484**	**2960**	<1	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**22**	**68**	<1	----	----
Magnesium	7439-95-4	1	mg/L	**27**	**186**	<1	----	----
Sodium	7440-23-5	1	mg/L	**289**	**1510**	<1	----	----
Potassium	7440-09-7	1	mg/L	**18**	**66**	<1	----	----
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**166**	**936**	<1	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.4**	**0.5**	<0.1	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.28**	**0.20**	<0.01	----	----
EN055: Ionic Balance								
ø **Total Anions**	----	0.01	meq/L	**17.6**	**92.6**	**0.04**	----	----
ø **Total Cations**	----	0.01	meq/L	**16.4**	**86.1**	<0.01	----	----
ø **Ionic Balance**	----	0.01	%	**3.82**	**3.63**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	**0.319**	<0.002	<0.002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	**0.632**	<0.002	<0.002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	**6.94**	**0.008**	<0.002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	**0.656**	<0.002	<0.002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	**13.3**	**0.014**	<0.002	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GW01_190612**	**GW06_190612**	**QC305_190612**	**----**	**----**
			Client sampling date / time	12-Jun-2019 12:45	12-Jun-2019 14:00	12-Jun-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1915332-001**	**EB1915332-002**	**EB1915332-003**	**--------**	**--------**
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	**0.08**	<0.01	<0.01	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	**0.210**	<0.002	<0.002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	**0.939**	<0.002	<0.002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	**0.142**	<0.002	<0.002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	**0.508**	<0.002	<0.002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	**0.012**	<0.002	<0.002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**GW01_190612**	**GW06_190612**	**QC305_190612**	----	----
			Client sampling date / time	12-Jun-2019 12:45	12-Jun-2019 14:00	12-Jun-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	**EB1915332-001**	**EB1915332-002**	**EB1915332-003**	--------	--------
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	**23.7**	**0.022**	<0.002	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	**20.2**	**0.022**	<0.002	----	----
Sum of PFAS (WA DER List)	----	0.002	µg/L	**22.4**	**0.022**	<0.002	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	**78.1**	**102**	**99.7**	----	----
13C8-PFOA	----	0.002	%	**87.6**	**113**	**115**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

		Recovery Limits (%)	
Compound	*CAS Number*	**Low**	**High**
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130
13C8-PFOA	----	70	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1915332**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 13-Jun-2019
Order number	: 60597459 1.0	Date Analysis Commenced	: 14-Jun-2019
C-O-C number	: ----	Issue Date	: 20-Jun-2019
Sampler	: MAX SETCHFIELD		
Site	: ----		
Quote number	: EN/004/16		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
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General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2405016)									
EB1915317-017	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	1	95.2	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	3	1	95.2	No Limit
EB1915332-002	GW06_190612	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	91	92	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	91	92	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2404349)									
EB1915332-003	QC305_190612	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
EB1915112-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	349	348	0.419	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2404350)									
EB1915112-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	119	119	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2404347)									
EB1915314-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	58	59	1.98	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EB1915329-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	16	16	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2405014)									
EB1915292-032	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.2	1.2	0.00	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2404351)									
EB1915332-003	QC305_190612	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2405820)									
EB1914877-001	Anonymous	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.017	0.015	13.4	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.021	0.018	12.8	0% - 50%
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.169	0.149	12.3	0% - 20%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	0.008	0.006	20.7	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.019	0.018	6.56	No Limit
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2405820)									
EB1914877-001	Anonymous	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2405820)									
EB1914877-001	Anonymous	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	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: 2405820)									
EB1914877-001	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2405820)									
EB1914877-001	Anonymous	EP231X-LL: Sum of PFAS	----	0.002	µg/L	0.234	0.206	12.7	0% - 20%
		EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.188	0.167	11.8	0% - 20%
		EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	0.205	0.182	11.9	0% - 20%

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
ED037P: Alkalinity by PC Titrator (QCLot: 2405016)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.7	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2404349)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	85	118
				<1	100 mg/L	104	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 2404350)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.0	90	115
				<1	1000 mg/L	104	90	115
ED093F: Dissolved Major Cations (QCLot: 2404347)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2405014)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	106	80	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2404351)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.1	88	115
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2405820)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0442 µg/L	84.8	50	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0469 µg/L	87.0	50	130
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0473 µg/L	82.2	50	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0476 µg/L	76.7	50	130
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0464 µg/L	73.5	50	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0482 µg/L	50.8	40	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2405820)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.25 µg/L	81.0	50	130
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	79.6	50	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	88.0	50	130
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	86.6	50	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	88.6	50	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	74.4	50	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	65.2	50	130
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	62.8	40	130
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	62.8	40	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2405820) - continued								
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	80.6	40	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	79.7	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2405820)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	73.8	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	60.2	40	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	59.4	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.125 µg/L	52.4	50	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	65.4	40	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	61.2	50	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	61.6	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2405820)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0467 µg/L	87.6	50	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0474 µg/L	81.4	50	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.0479 µg/L	76.8	50	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0482 µg/L	51.0	50	130
EP231P: PFAS Sums (QCLot: 2405820)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2404349)							
EB1915112-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2404350)							
EB1915112-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	99.4	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	Concentration	MS	Low	High
EK040P: Fluoride by PC Titrator (QCLot: 2405014)							
EB1915292-033	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	95.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2404351)							
EB1915215-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	92.5	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2405820)							
EB1915330-002	Anonymous	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.05 µg/L	76.4	50	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.05 µg/L	83.0	50	130
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.05 µg/L	83.8	50	130
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.05 µg/L	83.2	50	130
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.05 µg/L	78.8	50	130
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.05 µg/L	52.2	40	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2405820)							
EB1915330-002	Anonymous	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	60.2	50	130
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	82.8	50	130
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	87.6	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	85.6	50	130
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.05 µg/L	94.4	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	78.2	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	71.6	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	74.6	40	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	66.2	40	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	93.2	40	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	73.3	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2405820)							
EB1915330-002	Anonymous	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	79.2	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	58.6	40	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	59.4	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.125 µg/L	55.6	50	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	67.8	40	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	64.6	50	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	58.8	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2405820)							
EB1915330-002	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	85.4	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2405820) - continued							
EB1915330-002	Anonymous	EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	70.6	50	130
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	79.0	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	50.0	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1915332**	Page	: 1 of 6
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 13-Jun-2019
Site	: ----	Issue Date	: 20-Jun-2019
Sampler	: MAX SETCHFIELD	No. of samples received	: 3
Order number	: 60597459 1.0	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1915112--002	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	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: **WATER**

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

Method		*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)			*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) GW01_190612, QC305_190612	GW06_190612,	**12-Jun-2019**	**----**	----	----	**14-Jun-2019**	26-Jun-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) GW01_190612, QC305_190612	GW06_190612,	**12-Jun-2019**	**----**	----	----	**14-Jun-2019**	10-Jul-2019	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) GW01_190612, QC305_190612	GW06_190612,	**12-Jun-2019**	**----**	----	----	**14-Jun-2019**	10-Jul-2019	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) GW01_190612, QC305_190612	GW06_190612,	**12-Jun-2019**	**----**	----	----	**18-Jun-2019**	19-Jun-2019	✓
ED093F: SAR and Hardness Calculations								
Clear Plastic Bottle - Natural (ED093F) GW01_190612, QC305_190612	GW06_190612,	**12-Jun-2019**	**----**	----	----	**18-Jun-2019**	19-Jun-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) GW01_190612, QC305_190612	GW06_190612,	**12-Jun-2019**	**----**	----	----	**14-Jun-2019**	10-Jul-2019	✓

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*
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) GW01_190612, GW06_190612, QC305_190612	**12-Jun-2019**	**----**	----	----	**14-Jun-2019**	14-Jun-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL) GW01_190612, GW06_190612, QC305_190612	**12-Jun-2019**	**14-Jun-2019**	09-Dec-2019	✓	**14-Jun-2019**	09-Dec-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-LL) GW01_190612, GW06_190612, QC305_190612	**12-Jun-2019**	**14-Jun-2019**	09-Dec-2019	✓	**14-Jun-2019**	09-Dec-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL) GW01_190612, GW06_190612, QC305_190612	**12-Jun-2019**	**14-Jun-2019**	09-Dec-2019	✓	**14-Jun-2019**	09-Dec-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL) GW01_190612, GW06_190612, QC305_190612	**12-Jun-2019**	**14-Jun-2019**	09-Dec-2019	✓	**14-Jun-2019**	09-Dec-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-LL) GW01_190612, GW06_190612, QC305_190612	**12-Jun-2019**	**14-Jun-2019**	09-Dec-2019	✓	**14-Jun-2019**	09-Dec-2019	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	11	**9.09**	**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*
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
alsglobal.com

ng NSW 2500
om

Environmental Division
Brisbane
Work Order Reference
EB1913763

Telephone : + 61-7-3243 7222

No	N/A
No	N/A
°C	

CLIENT: AECOM

OFFICE: Brisbane

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Camden McCosker

SAMPLER MOBILE: 0499 990 214

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com

Email Invoice to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com

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

☑ Standard TAT (List due date):

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: 1 [✓ 2] 3 4 5 6 7

RELINQUISHED BY: Camden

DATE/TIME: 29/5/19 1420

RECEIVED BY: Dan

DATE/TIME: 29/5/19 14-55

RELI

DATE

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-X (PFAS 28)	NT-1S (Cations - Ca/Mg/Na/K)	NT-2S (Anions (Cl/SO4))	HCO3	PO4	F	S-5 (TRGH/BTEXN/8 Metals)	S-18 (TRH c6-C10/BTEXN)	~~BTEXN~~ Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH01_0-0-0.1	28/5/19	S	1P	1	✓									
2	-0.5				1	✓									
3	-1.0				1									✓	
4	-2.0				1									✓	
5	-3.0				1									✓	
6	BH02_0-0-0.1				1	✓									
7	-0.5				1	✓									
8	-1.0				1									✓	
9	-2.0				1									✓	
10	-3.0				1									✓	
11	BH03-0-0-0.1				1	✓									
12	-0.5				1	✓									
				TOTAL											

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

CLIENT: AECOM

OFFICE:

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Camden McCosker

SAMPLER MOBILE: 0499 990 214

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): **Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com**

Email Invoice to (will default to PM if no other addresses are listed): **Ona.Kanas@aecom.com; james.peachey@aecom.com**

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

☑ Standard TAT (List due date):

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: 1 (2) 3 4 5 6 7

OF: 1 (2) 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY: Camden
DATE/TIME: 29/5/19 1420

RECEIVED BY: Dan
DATE/TIME: 29/5/19 14-55

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-X (PFAS 28)	NT-1S (Cations - Ca/Mg/Na/K)	NT-2S (Anions (Cl/SO4))	HCO3	PO4	F	S-5 (TRGH/BTEXN/8 Metals)	S-18 (TRH c6-C10/BTEXN)	~~BTEXN~~ Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH03- 1.0	28/5/19	S	1P	1									✓	
14	-2.0	↓	↓	↓	1									✓	
15	-3.0	↓	↓	↓	1									✓	
16	QC100-190528	↓	↓	↓	1	✓									
17	QC101-190528	↓	↓	↓	1									✓	
18	QC300-190528	↓	↓	↓	1	✓									
19	QC301-190528	↓	↓	↓	1	✓									
20	QC302-190528	↓	↓	↓	1	✓									
				TOTAL											

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

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EB1913763**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: james.peachey@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: 60597459 1.0	Page	: 1 of 3
Order number	: 60597459 1.0	Quote number	: EB2017AECOMAU0014 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CAMDEN McCOSKER		

Dates

Date Samples Received	: 29-May-2019 14:55	Issue Date	: 29-May-2019
Client Requested Due Date	: 05-Jun-2019	Scheduled Reporting Date	: **05-Jun-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 5.7°C - Ice present
Receipt Detail	: MED ESKY	No. of samples received / analysed	: 20 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- **Samples "QC200_190528" and "QC201_190528" has been forwarded to NMI, as requested. Please note that this will incur a freight forwarding fee.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EB1913763-001	28-May-2019 00:00	BH01_0.0-0.1		✓	✓
EB1913763-002	28-May-2019 00:00	BH01_0.5		✓	✓
EB1913763-003	28-May-2019 00:00	BH01_1.0	✓		
EB1913763-004	28-May-2019 00:00	BH01_2.0	✓		
EB1913763-005	28-May-2019 00:00	BH01_3.0	✓		
EB1913763-006	28-May-2019 00:00	BH02_0.0-0.1		✓	✓
EB1913763-007	28-May-2019 00:00	BH02_0.5		✓	✓
EB1913763-008	28-May-2019 00:00	BH02_1.0	✓		
EB1913763-009	28-May-2019 00:00	BH02_2.0	✓		
EB1913763-010	28-May-2019 00:00	BH02_3.0	✓		
EB1913763-011	28-May-2019 00:00	BH03_0.0-0.1		✓	✓
EB1913763-012	28-May-2019 00:00	BH03_0.5		✓	✓
EB1913763-013	28-May-2019 00:00	BH03_1.0	✓		
EB1913763-014	28-May-2019 00:00	BH03_2.0	✓		
EB1913763-015	28-May-2019 00:00	BH03_3.0	✓		
EB1913763-016	28-May-2019 00:00	QC100_190528		✓	✓
EB1913763-017	28-May-2019 00:00	QC101_190529	✓		

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)
EB1913763-018	28-May-2019 00:00	QC300_190530	✓
EB1913763-019	28-May-2019 00:00	QC301_190531	✓
EB1913763-020	28-May-2019 00:00	QC302_190532	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE		
- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com
CAMDEN McCOSKER		
- *AU Certificate of Analysis - NATA (COA)	Email	camden.mccosker@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	camden.mccosker@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	camden.mccosker@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	camden.mccosker@aecom.com
- Chain of Custody (CoC) (COC)	Email	camden.mccosker@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	camden.mccosker@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	camden.mccosker@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	camden.mccosker@aecom.com
- EDI Format - XTab (XTAB)	Email	camden.mccosker@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	camden.mccosker@aecom.com
JAMES PEACHEY		
- *AU Certificate of Analysis - NATA (COA)	Email	james.peachey@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	james.peachey@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	james.peachey@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	james.peachey@aecom.com
- A4 - AU Tax Invoice (INV)	Email	james.peachey@aecom.com
- Chain of Custody (CoC) (COC)	Email	james.peachey@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	james.peachey@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	james.peachey@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	james.peachey@aecom.com
- EDI Format - XTab (XTAB)	Email	james.peachey@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	james.peachey@aecom.com
ONA KANAS		
- *AU Certificate of Analysis - NATA (COA)	Email	ona.kanas@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ona.kanas@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ona.kanas@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ona.kanas@aecom.com
- A4 - AU Tax Invoice (INV)	Email	ona.kanas@aecom.com
- Chain of Custody (CoC) (COC)	Email	ona.kanas@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	ona.kanas@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	ona.kanas@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	ona.kanas@aecom.com
- EDI Format - XTab (XTAB)	Email	ona.kanas@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	ona.kanas@aecom.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order : **EB1913763**
Client : **AECOM Australia Pty Ltd**
Contact : MR JAMES PEACHEY
Address :

Brisbane
Telephone : +61 07 3553 2000
Project : 60597459 1.0
Order number : 60597459 1.0
C-O-C number : ----
Sampler : CAMDEN McCOSKER
Site : ----
Quote number : EN/004/16
No. of samples received : 20
No. of samples analysed : 10

Page : 1 of 9
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 29-May-2019 14:55
Date Analysis Commenced : 31-May-2019
Issue Date : 06-Jun-2019 15:40

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Santusha Pandra	Organic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- EP231X: High matrix spike recovery for sample 'BH01_0.5' due to sample heterogeneity.
- EP231X: Particular samples shows poor surrogate recovery due to matrix interference. Confirmed by re-extraction and re-analysis.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH01_0.0-0.1**	**BH01_0.5**	**BH02_0.0-0.1**	**BH02_0.5**	**BH03_0.0-0.1**
			Client sampling date / time	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1913763-001**	**EB1913763-002**	**EB1913763-006**	**EB1913763-007**	**EB1913763-011**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**8.1**	**15.1**	**9.8**	**9.1**	**5.5**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0003**	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0004**	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	**0.0008**	<0.0002	**0.0040**	<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	**0.0004**	**0.0044**	**0.0013**	<0.0002	**0.0023**
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	**0.0006**	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH01_0.0-0.1**	**BH01_0.5**	**BH02_0.0-0.1**	**BH02_0.5**	**BH03_0.0-0.1**
			Client sampling date / time	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EB1913763-001**	**EB1913763-002**	**EB1913763-006**	**EB1913763-007**	**EB1913763-011**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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)	24448-09-7	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	**0.0004**	**0.0052**	**0.0013**	**0.0053**	**0.0023**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0004**	**0.0052**	**0.0013**	**0.0040**	**0.0023**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0004**	**0.0052**	**0.0013**	**0.0049**	**0.0023**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**114**	**84.0**	**23.5**	**91.5**	**91.5**
13C8-PFOA	----	0.0002	%	**101**	**80.0**	**34.5**	**91.5**	**72.5**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH03_0.5**	**QC100_190528**	**----**	**----**	**----**
			Client sampling date / time	28-May-2019 00:00	28-May-2019 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1913763-012**	**EB1913763-016**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**5.6**	**10.0**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0046**	**0.0018**	----	----	----
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	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0002**	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**BH03_0.5**	**QC100_190528**	**----**	**----**	**----**
			Client sampling date / time	28-May-2019 00:00	28-May-2019 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1913763-012**	**EB1913763-016**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0048**	**0.0018**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0046**	**0.0018**	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0048**	**0.0018**	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**85.0**	**30.5**	----	----	----
13C8-PFOA	----	0.0002	%	**86.5**	**36.0**	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**QC300_190530**	**QC301_190531**	**QC302_190532**	**----**	**----**
			Client sampling date / time	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1913763-018**	**EB1913763-019**	**EB1913763-020**	**--------**	**--------**
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----

Analytical Results

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

			Client sample ID	**QC300_190530**	**QC301_190531**	**QC302_190532**	**----**	**----**
			Client sampling date / time	28-May-2019 00:00	28-May-2019 00:00	28-May-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1913763-018**	**EB1913763-019**	**EB1913763-020**	**--------**	**--------**
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**105**	**107**	**96.5**	----	----
13C8-PFOA	----	0.02	%	**99.0**	**98.3**	**97.9**	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130
13C8-PFOA	----	70	130

Sub-Matrix: **WATER**

		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130
13C8-PFOA	----	70	130

QUALITY CONTROL REPORT

Work Order : **EB1913763**
Client : **AECOM Australia Pty Ltd**
Contact : MR JAMES PEACHEY
Address :

Brisbane
Telephone : +61 07 3553 2000
Project : 60597459 1.0
Order number : 60597459 1.0
C-O-C number : ----
Sampler : CAMDEN McCOSKER
Site : ----
Quote number : EN/004/16
No. of samples received : 20
No. of samples analysed : 10

Page : 1 of 11
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 29-May-2019
Date Analysis Commenced : 31-May-2019
Issue Date : 06-Jun-2019

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*
Santusha Pandra	Organic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2380387)									
EB1913763-001	BH01_0.0-0.1	EA055: Moisture Content	----	0.1	%	8.1	8.0	0.00	0% - 20%
EB1913774-004	Anonymous	EA055: Moisture Content	----	0.1	%	15.6	15.0	3.97	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2380337)									
EB1913763-001	BH01_0.0-0.1	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	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB1913774-004	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	<0.0002	<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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2380337)									
EB1913763-001	BH01_0.0-0.1	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

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: 2380337) - continued									
EB1913763-001	BH01_0.0-0.1	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
EB1913774-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0046	0.0046	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0069	0.0074	6.45	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0003	0.0004	27.3	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0005	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0015	0.0014	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0028	0.0030	6.05	0% - 50%
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0010	0.0010	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0013	0.0013	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: 2380337)									
EB1913763-001	BH01_0.0-0.1	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)	24448-09-7	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
EB1913774-004	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)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2380337)									
EB1913763-001	BH01_0.0-0.1	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
EB1913774-004	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	0.0407	0.0458	12.0	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0174	0.0187	6.88	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0176	0.0214	19.8	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2378123)									
EB1913724-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.06	0.05	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EB1913774-010	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: 2378123)									
EB1913724-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory 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: 2378123) - continued									
EB1913724-001	Anonymous	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
EB1913774-010	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.66	0.67	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.47	0.48	2.10	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.12	0.12	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: 2378123)									
EB1913724-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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
EB1913774-010	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)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2378123)									
EB1913724-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EB1913774-010	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	2.49	2.52	1.20	0% - 20%
		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: 2378123)									
EB1913724-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.06	0.05	18.2	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.06	0.05	18.2	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.06	0.05	18.2	No Limit
EB1913774-010	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	3.86	3.91	1.29	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	3.86	3.91	1.29	0% - 20%

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

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

Sub-Matrix: **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*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2380337)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	101	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00117 mg/kg	88.0	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	91.5	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	94.1	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	87.5	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	92.1	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2380337)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	56.1	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.2	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2380337)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	79.6	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	75.5	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	64.9	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	74.2	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	99.6	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2380337)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00116 mg/kg	108	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	108	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00119 mg/kg	97.0	62	130

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*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2380337) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	109	60	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2378123)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.442 µg/L	92.3	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.469 µg/L	84.9	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.473 µg/L	88.8	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.476 µg/L	95.8	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.464 µg/L	78.2	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.482 µg/L	102	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2378123)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	89.4	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	85.0	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	85.6	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	83.4	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	87.2	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	83.4	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	86.4	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	85.0	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	# 65.0	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	89.4	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2378123)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	87.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	90.6	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	78.3	70	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	86.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	83.5	70	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	88.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	78.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2378123)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.467 µg/L	94.2	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.474 µg/L	99.8	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	 High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2378123) - continued								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.479 µg/L	108	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.482 µg/L	122	70	130
EP231P: PFAS Sums (QCLot: 2378123)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

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	 High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2380337)							
EB1913763-002	BH01_0.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	78.4	57	121
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	78.4	55	125
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	81.1	52	126
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	78.4	54	123
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# 151	55	127
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	74.4	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2380337)							
EB1913763-002	BH01_0.5	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	52.8	52	128
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	82.0	54	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	86.8	58	127
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	88.0	57	128
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	87.2	60	134
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	89.2	63	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	55	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	94.8	62	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	76.0	53	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	77.6	49	129
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	78.0	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2380337)							
EB1913763-002	BH01_0.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	74.0	52	132
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	84.4	65	126

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: 2380337) - continued							
EB1913763-002	BH01_0.5	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	81.4	64	126
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	82.7	63	124
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	62.5	58	125
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	89.2	61	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	93.2	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2380337)							
EB1913763-002	BH01_0.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	88.0	54	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	90.0	61	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	91.6	62	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	87.2	60	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: 2378123)							
EB1913724-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	92.4	70	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	95.4	70	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	91.0	70	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	105	70	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	89.0	70	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	103	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2378123)							
EB1913724-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	84.8	70	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	97.6	70	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	103	70	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	100	70	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	95.6	70	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	102	70	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	98.0	70	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	102	70	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	105	70	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	83.8	70	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	106	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2378123)							
EB1913724-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	99.6	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	***Client sample ID***	***Method: Compound***	***CAS Number***	***Concentration***	***MS***	***Low***	***High***
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2378123) - continued							
EB1913724-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	120	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	106	70	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	94.6	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	100	70	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	111	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	94.0	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2378123)							
EB1913724-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	103	70	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	117	70	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	117	70	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	114	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1913763**	Page	: 1 of 6
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: MR JAMES PEACHEY	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 29-May-2019
Site	: ----	Issue Date	: 06-Jun-2019
Sampler	: CAMDEN McCOSKER	No. of samples received	: 20
Order number	: 60597459 1.0	No. of samples analysed	: 10

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **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	EB1913763--002	BH01_0.5	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	151 %	55-127%	**Recovery greater than upper data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP231B: Perfluoroalkyl Carboxylic Acids	QC-2378123-002	----	**Perfluorotridecanoic acid (PFTrDA)**	72629-94-8	65.0 %	70-130%	**Recovery less than lower control limit**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP231S: PFAS Surrogate	EB1913763-006	BH02_0.0-0.1	**13C4-PFOS**	----	23.5 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1913763-016	QC100_190528	**13C4-PFOS**	----	30.5 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1913763-006	BH02_0.0-0.1	**13C8-PFOA**	----	34.5 %	70-130 %	**Recovery less than lower data quality objective**
EP231S: PFAS Surrogate	EB1913763-016	QC100_190528	**13C8-PFOA**	----	36.0 %	70-130 %	**Recovery less than lower data quality objective**

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 (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) BH01_0.0-0.1, BH01_0.5, BH02_0.0-0.1, BH02_0.5, BH03_0.0-0.1, BH03_0.5, QC100_190528	**28-May-2019**	**----**	----	----	**31-May-2019**	11-Jun-2019	✓

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) BH01_0.0-0.1, BH01_0.5, BH02_0.0-0.1, BH02_0.5, BH03_0.0-0.1, BH03_0.5, QC100_190528	**28-May-2019**	**01-Jun-2019**	24-Nov-2019	✓	**03-Jun-2019**	11-Jul-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) BH01_0.0-0.1, BH01_0.5, BH02_0.0-0.1, BH02_0.5, BH03_0.0-0.1, BH03_0.5, QC100_190528	**28-May-2019**	**01-Jun-2019**	24-Nov-2019	✓	**03-Jun-2019**	11-Jul-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) BH01_0.0-0.1, BH01_0.5, BH02_0.0-0.1, BH02_0.5, BH03_0.0-0.1, BH03_0.5, QC100_190528	**28-May-2019**	**01-Jun-2019**	24-Nov-2019	✓	**03-Jun-2019**	11-Jul-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) BH01_0.0-0.1, BH01_0.5, BH02_0.0-0.1, BH02_0.5, BH03_0.0-0.1, BH03_0.5, QC100_190528	**28-May-2019**	**01-Jun-2019**	24-Nov-2019	✓	**03-Jun-2019**	11-Jul-2019	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) BH01_0.0-0.1, BH01_0.5, BH02_0.0-0.1, BH02_0.5, BH03_0.0-0.1, BH03_0.5, QC100_190528	**28-May-2019**	**01-Jun-2019**	24-Nov-2019	✓	**03-Jun-2019**	11-Jul-2019	✓

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) QC300_190530, QC301_190531, QC302_190532	**28-May-2019**	**31-May-2019**	24-Nov-2019	✓	**31-May-2019**	24-Nov-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) QC300_190530, QC301_190531, QC302_190532	**28-May-2019**	**31-May-2019**	24-Nov-2019	✓	**31-May-2019**	24-Nov-2019	✓

Matrix: **WATER**

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

Method		***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container */ Client Sample ID(s)*			***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
QC300_190530, QC302_190532	QC301_190531,	**28-May-2019**	**31-May-2019**	24-Nov-2019	✓	**31-May-2019**	24-Nov-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
QC300_190530, QC302_190532	QC301_190531,	**28-May-2019**	**31-May-2019**	24-Nov-2019	✓	**31-May-2019**	24-Nov-2019	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
QC300_190530, QC302_190532	QC301_190531,	**28-May-2019**	**31-May-2019**	24-Nov-2019	✓	**31-May-2019**	24-Nov-2019	✓

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	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		*Count*		*Rate (%)*			*Quality Control Specification*
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
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. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
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. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.

From: Peachey, James [mailto:james.peachey@aecom.com]
Sent: Monday, 10 June 2019 9:36 AM
To: Carsten Emrich <Carsten.Emrich@alsglobal.com>
Cc: ALSEnviro Brisbane <ALSEnviro.Brisbane@alsglobal.com>; Kanas, Ona <Ona.Kanas@aecom.com>
Subject: [EXTERNAL] - FW: RESULTS & EDD & INVOICE for ALS Workorder : EB1913763 | Your Reference: 60597459 1.0 - rebatch

Hi Carsten,

Please could we rebatch sample -007 (BH02 0.5) for PFAS TOPA leachability using TCLP (pH 5).

Regards

Environmental Division
Brisbane
Work Order Reference
EB1914845

Telephone : + 61-7-3243 7222

James Peachey
Associate Director - Environment
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Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1914845**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: james.peachey@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3552 8616
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: 60597459 1.0	Page	: 1 of 3
Order number	: 60597459 1.0	Quote number	: EB2017AECOMAU0014 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CAMDEN McCOSKER		

Dates

Date Samples Received	: 10-Jun-2019 09:36	Issue Date	: 10-Jun-2019
Client Requested Due Date	: 17-Jun-2019	Scheduled Reporting Date	: **17-Jun-2019**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: 0	Temperature	: ----
Receipt Detail	: REBATCH	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
    - Sample Container(s)/Preservation Non-Compliances
    - Summary of Sample(s) and Requested Analysis
    - Proactive Holding Time Report
    - Requested Deliverables
- **This work order has been created to rebatch a sample from EB1913763.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix**: SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EP231X (TOP) PFAS - Total Oxidisable Precursor (TOP) Assay	SOIL - TCLP TCLP Leach
EB1914845-001	28-May-2019 00:00	BH02_0.5	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

CAMDEN McCOSKER

- *AU Certificate of Analysis - NATA (COA)	Email	camden.mccosker@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	camden.mccosker@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	camden.mccosker@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	camden.mccosker@aecom.com
- Chain of Custody (CoC) (COC)	Email	camden.mccosker@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	camden.mccosker@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	camden.mccosker@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	camden.mccosker@aecom.com
- EDI Format - XTab (XTAB)	Email	camden.mccosker@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	camden.mccosker@aecom.com

JAMES PEACHEY

- *AU Certificate of Analysis - NATA (COA)	Email	james.peachey@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	james.peachey@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	james.peachey@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	james.peachey@aecom.com
- Chain of Custody (CoC) (COC)	Email	james.peachey@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	james.peachey@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	james.peachey@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	james.peachey@aecom.com
- EDI Format - XTab (XTAB)	Email	james.peachey@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	james.peachey@aecom.com

ONA KANAS

- *AU Certificate of Analysis - NATA (COA)	Email	ona.kanas@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ona.kanas@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ona.kanas@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ona.kanas@aecom.com
- Chain of Custody (CoC) (COC)	Email	ona.kanas@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	ona.kanas@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	ona.kanas@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	ona.kanas@aecom.com
- EDI Format - XTab (XTAB)	Email	ona.kanas@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	ona.kanas@aecom.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1914845**	Page	: 1 of 6
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 10-Jun-2019 09:36
Order number	: 60597459 1.0	Date Analysis Commenced	: 11-Jun-2019
C-O-C number	: ----	Issue Date	: 17-Jun-2019 12:52
Sampler	: CAMDEN McCOSKER		
Site	: ----		
Quote number	: EN/004/16		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH02_0.5**	----	----	----	----
			Client sampling date / time	28-May-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**EB1914845-001**	--------	--------	--------	--------
				Result	----	----	----	----
EN33: TCLP Leach								
Final pH	----	0.1	pH Unit	**5.0**	----	----	----	----

Analytical Results

Sub-Matrix: **TCLP LEACHATE** (Matrix: **WATER**)			*Client sample ID*	**BH02_0.5**	**----**	**----**	**----**	**----**
			Client sampling date / time	28-May-2019 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914845-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP231_TOP_A: 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	**0.13**	----	----	----	----
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	----	----	----	----
EP231_TOP_B: 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	----	----	----	----
EP231_TOP_C: 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: **TCLP LEACHATE** (Matrix: **WATER**)			*Client sample ID*	**BH02_0.5**	**----**	**----**	**----**	**----**
			Client sampling date / time	28-May-2019 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1914845-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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	----	----	----	----
EP231_TOP_D: (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	----	----	----	----
EP231_TOP_P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.14**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.14**	----	----	----	----
Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.01	µg/L	**0.14**	----	----	----	----
^ **Sum of TOP C4 - C14 as Fluorine**	----	0.01	µg/L	**0.09**	----	----	----	----
EP231_TOP_S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**118**	----	----	----	----
13C8-PFOA	----	0.02	%	**120**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP231_TOP_S: PFAS Surrogate			
13C4-PFOS	----	60	130
13C8-PFOA	----	60	130

Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1914845**	Page	: 1 of 5
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 10-Jun-2019
Order number	: 60597459 1.0	Date Analysis Commenced	: 11-Jun-2019
C-O-C number	: ----	Issue Date	: 17-Jun-2019
Sampler	: CAMDEN McCOSKER		
Site	: ----		
Quote number	: EN/004/16		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix**: WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2401727)									
EB1915121-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2.17	2.11	2.85	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.04	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.31	0.29	7.26	0% - 50%
		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
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2401727)									
EB1915121-001	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	0.13	0.12	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.34	0.31	9.23	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
EP231_TOP_C: Perfluoroalkyl Sulfonamides (QC Lot: 2401727)									
EB1915121-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231_TOP_C: Perfluoroalkyl Sulfonamides (QC Lot: 2401727) - continued									
EB1915121-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2401727)									
EB1915121-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231_TOP_P: PFAS Sums (QC Lot: 2401727)									
EB1915121-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	3.14	3.01	4.23	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	2.48	2.40	3.28	0% - 20%
		EP231X: Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.01	µg/L	3.14	3.01	4.23	0% - 20%
		EP231X: Sum of TOP C4 - C14 as Fluorine	----	0.01	µg/L	2.02	1.94	4.22	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 Concentration	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*		*LCS*	*Low*	*High*
EN33: TCLP Leach (QCLot: 2397570)								
EN33a: Final pH	----	0.1	pH Unit	5.0	----	----	----	----

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike Concentration	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*		*LCS*	*Low*	*High*
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids (QCLot: 2401727)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.946 µg/L	79.4	50	150
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.928 µg/L	76.0	50	150
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids (QCLot: 2401727)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	1 µg/L	82.2	50	150
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides (QCLot: 2401727)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----

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
EP231_TOP_C: Perfluoroalkyl Sulfonamides (QCLot: 2401727) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2401727)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.0948 µg/L	0.00	0	200
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231_TOP_P: PFAS Sums (QCLot: 2401727)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfonates	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of TOP C4 - C14 as Fluorine	----	0.01	µg/L	<0.01	----	----	----	----

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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1914845**	Page	: 1 of 4
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 10-Jun-2019
Site	: ----	Issue Date	: 17-Jun-2019
Sampler	: CAMDEN McCOSKER	No. of samples received	: 1
Order number	: 60597459 1.0	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

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

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

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

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

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EN33: TCLP Leach							
Non-Volatile Leach: 180 day HT (e.g. PFAS, metals ex.Hg) (EN33a) BH02_0.5	**28-May-2019**	**11-Jun-2019**	24-Nov-2019	✓	**----**	----	----

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X (TOP)) BH02_0.5	**11-Jun-2019**	**14-Jun-2019**	08-Dec-2019	✓	**14-Jun-2019**	08-Dec-2019	✓
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X (TOP)) BH02_0.5	**11-Jun-2019**	**14-Jun-2019**	08-Dec-2019	✓	**14-Jun-2019**	08-Dec-2019	✓
EP231_TOP_C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X (TOP)) BH02_0.5	**11-Jun-2019**	**14-Jun-2019**	08-Dec-2019	✓	**14-Jun-2019**	08-Dec-2019	✓
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X (TOP)) BH02_0.5	**11-Jun-2019**	**14-Jun-2019**	08-Dec-2019	✓	**14-Jun-2019**	08-Dec-2019	✓
EP231_TOP_P: PFAS Sums							
HDPE (no PTFE) (EP231X (TOP)) BH02_0.5	**11-Jun-2019**	**14-Jun-2019**	08-Dec-2019	✓	**14-Jun-2019**	08-Dec-2019	✓

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*	
Method Blanks (MB)							
TCLP for Non & Semivolatile Analytes	EN33a	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PFAS by LCMSMS after oxidation (TOP)	EP231X (TOP)	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PFAS by LCMSMS after oxidation (TOP)	EP231X (TOP)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PFAS by LCMSMS after oxidation (TOP)	EP231X (TOP)	1	3	**33.33**	**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*
PFAS by LCMSMS after oxidation (TOP)	EP231X (TOP)	SOIL	In house, following oxidation per Houtz,Erika F.; Sedlak,David L. (2012): Oxidative Conversion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff. In Environmental Science & Technology 46 (17),pp. 9342¿9349.: A portion of the oxidised sample is mixed with methanol (1:1) prior to analysis by LC-Electrospray-MS-MS,Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. 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.
Total Oxidisable Precursor Digest for PFAS	* ORG70-W	SOIL	In-House with oxidation per Houtz, Erika F.; Sedlak, David L. (2012): Oxidative Conversion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff. In Environmental Science & Technology 46 (17), pp. 9342¿9349: A 5 mL sample is digested with persulfate under alkaline conditions, neutralised and prepared for analysis per EP231.

AEC0Q6/190531 Due 7/6/19 mw

ALS Environmental

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ALS Laboratory: please tick →

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Ph: 08 8359 0890 E: adelaide@alsglobal.com

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☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740
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☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
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☐MUDGEE 27 Sydney Road Mudgee NSW 2850
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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

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

CLIENT: AECOM

OFFICE: Brisbane

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Camden McCosker

SAMPLER MOBILE: 0499 990 214

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): **Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com**

Email Invoice to (will default to PM if no other addresses are listed): **Ona.Kanas@aecom.com; james.peachey@aecom.com**

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

☑ Standard TAT **(List due date):**

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: [✓ 1] 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

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

RELINQUISHED BY: Camden	**RECEIVED BY:**	**RELINQUISHED BY:** JButinu	**RECEIVED BY:**
DATE/TIME: 29/5/19 1420	DATE/TIME:	DATE/TIME: 30/5	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please forward to MI with this COC

LAB00086641

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-X (PFAS 28)	NT-1S (Cations - Ca/Mg/Na/K)	NT-2S (Anions (Cl/SO4))	HCO3	PO4	F	S-5 (TRGH/BTEXN/8 Metals)	S-18 (TRH c6-C10/BTEXN)	~~BTEXN~~ Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
21	QC200_190528	28/5/19	S	1P	1	✓		N19/014217							Please forward to MI
22	QC201_190528	11	S	11	1			N19/014218						✓	
				TOTAL											

RECEIVED
31 MAY 2019
BY: AO 14:40 c

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

Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

Attention: ONA KANAS

Customer: AECOM AUSTRALIA PTY LTD

Address: LEVEL 8
FORTITUDE VALLEY QLD 4006

Email: ona.kanas@aecom.com

Telephone:

Fax:

LABORATORY DETAILS

Lab: National Measurement Institute

Contact: Susanne Neuman

Address: 105 Delhi Road, North Ryde, NSW
NSW 2113

Email: Susanne.Neuman@measurement.gov.au

Telephone: 02 9449 0181

Fax:

SAMPLE DETAILS

NMI Job Name: **AECO06/190531**

Total No. of Samples: **2**

LRNs	Customer Sample ID	Lab Sample Description
N19/014217	QC200_190528	SOIL 28/5/19
N19/014218	QC201_190528	SOIL 28/5/19

SAMPLE RECEIVED CONDITION

Date samples received:	31-MAY-2019
Sample received in good order:	Yes
NMI Quotation no. provided:	
Client purchase order number:	60597459
Temperature of samples:	Chilled
Comments:	ALL OK
Estimated report date:	7-JUN-2019
Mode of Delivery:	Courier

Additional Terms and Conditions

Incomplete / unclear information about samples or required testing will delay the start of the analysis work

If you require your Purchase Order (PO) number to be included on our invoice, please provide the number during sample submission and before the completion of work to avoid unnecessary delays and/or additional processing/handling fees.

The lodgement of an order or receipt of samples for NMI services referenced in this Sample Receipt Notification constitutes
an acceptence of the current version of NMI Terms and Conditions or other applicable Terms referenced in the NMI Quotation.
NMI Terms and Conditions are available on the web at
http://www.measurement.gov.au/Services/EnvironmentalTesting/Pages/Terms-and-Conditions.aspx

REPORT OF ANALYSIS

Report No. RN1235112

Client	:	AECOM AUSTRALIA PTY LTD LEVEL 8 540 WICKHAM STREET	**Job No.** **Quote No.** **Order No.** **Date Received**	:	AECO06/190531 QT-02129 60597459 31-MAY-2019
Attention	:	ONA KANAS	**Sampled By**	:	CLIENT
Project Name	:	60597459			
Your Client Services Manager	:	Richard Coghlan	**Phone**	:	02 9449 0161

Lab Reg No.	Sample Ref	Sample Description
N19/014217	QC200_190528	SOIL 28/5/19

Lab Reg No.		**N19/014217**				
Date Sampled		**28-MAY-2019**				
Sample Reference	**Units**	**QC200_190528**				**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	mg/kg	<0.002				NR70
PFPeA (2706-90-3)	mg/kg	<0.002				NR70
PFHxA (307-24-4)	mg/kg	<0.001				NR70
PFHpA (375-85-9)	mg/kg	<0.001				NR70
PFOA (335-67-1)	mg/kg	<0.001				NR70
PFNA (375-95-1)	mg/kg	<0.001				NR70
PFDA (335-76-2)	mg/kg	<0.001				NR70
PFUdA (2058-94-8)	mg/kg	<0.002				NR70
PFDoA (307-55-1)	mg/kg	<0.002				NR70
PFTrDA (72629-94-8)	mg/kg	<0.002				NR70
PFTeDA (376-06-7)	mg/kg	<0.002				NR70
PFHxDA (67905-19-5)	mg/kg	<0.002				NR70
PFODA (16517-11-6)	mg/kg	<0.005				NR70
FOUEA (70887-84-2)	mg/kg	<0.001				NR70
PFBS (375-73-5)	mg/kg	<0.001				NR70
PFPeS (2706-91-4)	mg/kg	<0.001				NR70
PFHxS (355-46-4)	mg/kg	<0.001				NR70
PFHpS (375-92-8)	mg/kg	<0.001				NR70
PFOS (1763-23-1)	mg/kg	0.0083				NR70
PFNS (68259-12-1)	mg/kg	<0.001				NR70
PFDS (335-77-3)	mg/kg	<0.001				NR70
PFOSA (754-91-6)	mg/kg	<0.001				NR70
N-MeFOSA (31506-32-8)	mg/kg	<0.002				NR70
N-EtFOSA (4151-50-2)	mg/kg	<0.002				NR70
N-MeFOSAA (2355-31-9)	mg/kg	<0.002				NR70
N-EtFOSAA(2991-50-6)	mg/kg	<0.002				NR70
N-MeFOSE (24448-09-7)	mg/kg	<0.005				NR70
N-EtFOSE (1691-99-2)	mg/kg	<0.005				NR70
4:2 FTS (757124-72-4)	mg/kg	<0.001				NR70

REPORT OF ANALYSIS

Lab Reg No.		**N19/014217**				
Date Sampled		**28-MAY-2019**				
Sample Reference	**Units**	**QC200_190528**				**Method**
PFAS (per-and poly-fluoroalkyl substances)						
6:2 FTS (27619-97-2)	mg/kg	<0.001				NR70
8:2 FTS (39108-34-4)	mg/kg	<0.001				NR70
10:2 FTS (120226-60-0)	mg/kg	<0.002				NR70
8:2 diPAP (678-41-1)	mg/kg	<0.002				NR70
PFBA (Surrogate Recovery)	%	100				NR70
PFPeA (Surrogate Recovery)	%	101				NR70
PFHxA (Surrogate Recovery)	%	103				NR70
PFHpA (Surrogate Recovery)	%	104				NR70
PFOA (Surrogate Recovery)	%	100				NR70
PFNA (Surrogate Recovery)	%	109				NR70
PFDA (Surrogate Recovery)	%	106				NR70
PFUdA (Surrogate Recovery)	%	93				NR70
PFDoA (Surrogate Recovery)	%	91				NR70
PFTeDA (Surrogate Recovery)	%	110				NR70
PFHxDA (Surrogate Recovery)	%	118				NR70
FOUEA (Surrogate Recovery)	%	58				NR70
PFBS (Surrogate Recovery)	%	98				NR70
PFHxS (Surrogate Recovery)	%	95				NR70
PFOS (Surrogate Recovery)	%	88				NR70
PFOSA (Surrogate Recovery)	%	100				NR70
N-MeFOSA (Surrogate Recovery)	%	108				NR70
N-EtFOSA (Surrogate Recovery)	%	103				NR70
N-MeFOSAA (Surrogate Recovery)	%	67				NR70
N-EtFOSAA (Surrogate Recovery)	%	74				NR70
N-MeFOSE (Surrogate Recovery)	%	101				NR70
N-EtFOSE (Surrogate Recovery)	%	96				NR70
4:2 FTS (Surrogate Recovery)	%	67				NR70
6:2 FTS (Surrogate Recovery)	%	67				NR70
8:2 FTS (Surrogate Recovery)	%	77				NR70
8:2 diPAP (Surrogate Recovery)	%	40				NR70
Dates						
Date extracted		2-APR-2000				
Date analysed		6-JUN-2019				

N19/014217

PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting. All results

corrected for labelled surrogate recoveries.

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

07-JUN-2019

Lab Reg No.	**Units**	**N19/014217**				**Method**
Date Sampled		**28-MAY-2019**				
Sample Reference		**QC200_190528**				
Trace Elements						
Total Solids	%	90.1				NT2_49

Pankaj Barai, Analyst
Inorganics - NSW
Accreditation No. 198

07-JUN-2019

All results are expressed on a dry weight basis.

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: *RN1235071* *RN1235104*

Measurement Uncertainty is available upon request.

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO006/190531 **Sample Matrix:** Solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
PFBA (375-22-4)	NR70	0.002	<0.002	NA	NA	NA	112	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	68	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	97	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	95	NA
PFUdA (2058-94-8)	NR70	0.002	<0.002	NA	NA	NA	104	NA
PFDoA (307-55-1)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	100	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	95	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	89	NA
PFODA (16517-11-6)	NR70	0.005	<0.005	NA	NA	NA	16	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	88	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	94	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	96	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	97	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	96	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	103	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	93	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	83	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	107	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	88	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	98	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	71	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	90	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	102	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	104	NA
10:2 FTS (120226-60-0)	NR70	0.002	<0.002	NA	NA	NA	109	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	94	NA

Results expressed in percentage (%) or mg/kg wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **7/06/2019**

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☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850
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☐NEWCASTLE 5/585 Maitland Road M
Ph 02 4014 2500 E samples.newcastl

☐NOWRA 4/13 Geary Place North Nowra
Ph 02 4423 2063 E nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 60
Ph 08 9209 7655 E samples.perth@a

Environmental Division
Brisbane
Work Order Reference
EB1908167

Telephone : + 61-7-3243 7222

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global.com

QLD 4817
alsglobal.com

rive Nth Wollongong NSW 2500
al.com

CLIENT: AECOM
OFFICE: BRISBANE
PROJECT: 60597459
PROJECT NO.:
ORDER NUMBER:
PURCHASE ORDER NO.:
PROJECT MANAGER: JAMES PEACHEY
CONTACT PH: (07) 3553 2000
SAMPLER: SEBASTIAN KNIGHT
SAMPLER MOBILE: 0403 282 171
COC Emailed to ALS? (YES / [✓ NO])
EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): PM and ona.kanas@aecom.com
Email Invoice to (will default to PM if no other addresses are listed): PM

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: [✓ 1] 2 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

FOR L
Custod Yes No N/A
Free ic Yes No N/A
Randor °C
Other c

RELINQUISHED BY: S. Knight
DATE/TIME: 29/3/19 09:30

RECEIVED BY: Howard
DATE/TIME: 9:30 29/3/19

RELINQUI
DATE/TIME:

EIVED BY: 1730 29/3/19
DATE/TIME: DMG R

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).											Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Super trace PFAS Suite	TRH / BTEX	Metals (Standard LOR)	E. coli	Total and Faecal Coliforms	Standard PFAS Suite						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SW13_F	27/3/19-14:30	W		7	X	X	X	X	X							
2	SS13	27/3/19-14:15	S		1		X	X			X						
3	PW13	27/3/19-16:15	S		12	X	X	X	X	X							6x bottles / 6x bags.
4	SW12_F	27/3/19-15:30	W		7	X	X	X	X	X							
5	SS12	27/3/19-15:30	S		1		X	X			X						
6	PW12	27/3/19-15:30	S		12	X	X	X	X	X							
7	SW11_F	27/3/19-16:30	W		7	X	X	X	X	X							
8	SS11	27/3/19-16:30	S		1		X	X			X						
9	[illegible]11	27/3/19-16:30	S		12	X	X	X	X	X							
10	[illegible]_F	28/3/19-16:00	W		7	X	X	X	X	X							
11	SS10	28/2/19-08:45	S		1		X	X			X						
12	PW10	28/3/19-08:45	S		12	X	X	X	X	X							
13	QC100	28/3/19-08:45	S		1		X	X			X						
14	QC101	28/3/19-08:45	S		12	X	X	X	X	X							
[illegible]	QC200	28/3/19-08:45	S		1		X	X			X						QC200- Triplicate sample for inter lab dup'licate
				TOTAL													

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

CHAIN OF CUSTODY

*ALS Laboratory: **please tick →*** ALS Sydney for PFOS/PFOA

ENT: Aecom
OFFICE: Brisbane
PROJECT Task #: (tick) 60597459
ORDER NUMBER:
PROJECT MANAGER: JAMES PEACHEY
CONTACT PH: 3553 2000
SAMPLER: Sebastian Knight
SAMPLER MOBILE: 0403 282 171
COC emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: PM and ona.kanas@aecom.com
Email Invoice to (will default to PM if no other addresses are listed): PM

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

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: 1 [✓ 2] 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Knight *NA*	Howard		Dale K
DATE/TIME: 09:30 NA 29/3/19	DATE/TIME: 9:30 29/3/19	DATE/TIME:	DATE/TIME: 1730 29/3/19

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ADDITIONAL ANALYSIS REQUEST

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Super trace PFAS suite	TRH / BTEXN	Metals (Standard LOR)	E. Coli	Total and faecal coliforms			Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
~~16~~ 15	SW10_E	29/3/19 - 7:30	W		7									
~~17~~ 16	SW11_E	29/3/19 - 7:10	W		7	X	X	X	X	X				
~~18~~ 17	SW12_E	29/3/19 - 6:50	W		7	X	X	X	X	X				
[redacted] 18	SW13_E	29/3/19 - 6:30	W		7	X	X	X	X	X				
[redacted] 19	QC102	29/3/19 - 7:30	W		7	X	X	X	X	X				
[redacted]	QC201	29/3/19 - 7:30	W		7	X	X	X	X	X				QC201 - [redacted] inter lab
				TOTAL	42									

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

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1908167**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: james.peachey@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3552 8616
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: 60597459 1.0	Page	: 1 of 5
Order number	: 60597459 1.0	Quote number	: EB2017AECOMAU0014 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SEBASTIAN KNIGHT		

Dates

Date Samples Received	: 29-Mar-2019 17:30	Issue Date	: 01-Apr-2019
Client Requested Due Date	: 08-Apr-2019	Scheduled Reporting Date	: **08-Apr-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 12.9°C<->19.6°C - Ice present
Receipt Detail	: Medium Esky	No. of samples received / analysed	: 19 / 19

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised, as the requested 'Super Trace PFAS' analysis on soil is not performed by ALS the EP231X standard PFAS schedule has been assigned in its place. If this is incorrect please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, as these samples were recieved outside of holding time the requested 'E. coli' and Total and Faecal Coliform' analysis on soils has not been assigned. If you would like to proceed with analysis outside of holding time please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, water samples 'SW13_F, SW12_F, SW11_F, SW10_F', were received outside of holding time however E. Coli and Coliform analysis has still been assigned to these instances. If you would like to remove this analysis please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, as no specific analytes have been listed, where 'Metals' has been requested on water the W-02T 8 metals analysis has been assigned. If this is incorrect please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, as no specific analytes have been listed, where 'Metals' analysis has been requested on soil the S-02 8 metals package has been assigned. If this is incorrect please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, there was a discrepancy between sample names and times for 'SW11_E' and SW11_F'. One sample was labeled 'SW11" and had a sampling time corresponding with the time for 'SW11F' and the sample labeled as 'SW11_F' had a sampling time corresponding with sample 'SW11E'. These samples have been ordered to match the sampling time given on the Chain of Custody. If this is incorrect please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- **Please be advised, sample 'PW13' was received with 7 Orange jars and sample 'PW12' with only 5. As the Chain of Custody states there are 6 jars with each sample the extra jar has been matched to sample 'PW12' by time sampled, if this is incorrect please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**

- **Triplicate samples will be forwarded to National Measurement Institute as per request. Please note, this will incur a freight forwarding fee.**
- ***01/04/2019*: SRN has been resent to acknowledge the addition of NMI as the recipient of interlab triplicate samples as per directive received from James Peachey on 01/04/2019. For any further information regarding these adjustments please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **PFAS Supertrace analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- **Samples 'QC200' and 'QC201' have been forwarded to ALS Sydney, as requested.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method ***Client sample ID***	**Sample Container Received**	**Preferred Sample Container for Analysis**
Total Mercury by FIMS : EG035T		
SS13	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS12	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS11	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS10	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
QC100	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
TRH - Semivolatile Fraction : EP071		
SS13	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS12	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS11	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS10	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
QC100	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
TRH Volatiles/BTEX : EP080		
SS13	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS12	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS11	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS10	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
QC100	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - S-02 8 Metals (incl. Digestion)
EB1908167-002	27-Mar-2019 14:15	SS13	✓	✓
EB1908167-003	27-Mar-2019 16:15	PW13	✓	✓
EB1908167-005	27-Mar-2019 15:30	SS12	✓	✓
EB1908167-006	27-Mar-2019 15:30	PW12	✓	✓
EB1908167-008	27-Mar-2019 16:30	SS11	✓	✓
EB1908167-009	27-Mar-2019 16:30	PW11	✓	✓
EB1908167-011	28-Mar-2019 08:45	SS10	✓	✓
EB1908167-012	28-Mar-2019 08:45	PW10	✓	✓
EB1908167-013	28-Mar-2019 08:45	QC100	✓	✓
EB1908167-014	28-Mar-2019 08:45	QC101	✓	✓

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EB1908167-002	27-Mar-2019 14:15	SS13	✓	✓
EB1908167-003	27-Mar-2019 16:15	PW13	✓	✓
EB1908167-005	27-Mar-2019 15:30	SS12	✓	✓
EB1908167-006	27-Mar-2019 15:30	PW12	✓	✓
EB1908167-008	27-Mar-2019 16:30	SS11	✓	✓
EB1908167-009	27-Mar-2019 16:30	PW11	✓	✓
EB1908167-011	28-Mar-2019 08:45	SS10	✓	✓
EB1908167-012	28-Mar-2019 08:45	PW10	✓	✓
EB1908167-013	28-Mar-2019 08:45	QC100	✓	✓
EB1908167-014	28-Mar-2019 08:45	QC101	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EP231X-ST PFAS - Super Trace Waters Long Suite (28	WATER - MW006 (FC & Ec) Thermotolerant Coliforms & E.coli by Membrane	WATER - MW007 Total Coliforms by Membrane Filtration	WATER - W-02T 8 metals (Total)	WATER - W-04 TRH/BTEXN
EB1908167-001	27-Mar-2019 14:30	SW13_F	✓	✓	✓	✓	✓
EB1908167-004	27-Mar-2019 15:30	SW12_F	✓	✓	✓	✓	✓
EB1908167-007	27-Mar-2019 16:30	SW11_F	✓	✓	✓	✓	✓
EB1908167-010	28-Mar-2019 16:00	SW10_F	✓	✓	✓	✓	✓
EB1908167-015	29-Mar-2019 07:30	SW10_E	✓	✓	✓	✓	✓
EB1908167-016	29-Mar-2019 07:10	SW11_E	✓	✓	✓	✓	✓
EB1908167-017	29-Mar-2019 06:50	SW12_E	✓	✓	✓	✓	✓
EB1908167-018	29-Mar-2019 07:30	SW13_E	✓	✓	✓	✓	✓
EB1908167-019	29-Mar-2019 07:30	QC102	✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Matrix: **WATER**

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

Method **Client Sample ID(s)**	**Container**	**Due for extraction**	**Due for analysis**	**Samples Received**		**Instructions Received**	
				Date	**Evaluation**	**Date**	**Evaluation**
MW006: Thermotolerant Coliforms & E.coli by Membrane Filtration							
QC102	Sterile Plastic Bottle - Sodium T	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW10_E	Sterile Plastic Bottle - Sodium T	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW10_F	Sterile Plastic Bottle - Sodium T	----	29-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗

SW11_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW11_F	Sterile Plastic Bottle - Sodium Tl	----	28-Mar-2019	29-Mar-2019	✗	01-Apr-2019	✗
SW12_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW12_F	Sterile Plastic Bottle - Sodium Tl	----	28-Mar-2019	29-Mar-2019	✗	01-Apr-2019	✗
SW13_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW13_F	Sterile Plastic Bottle - Sodium Tl	----	28-Mar-2019	29-Mar-2019	✗	01-Apr-2019	✗
MW007: Coliforms by Membrane Filtration							
QC102	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW10_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW10_F	Sterile Plastic Bottle - Sodium Tl	----	29-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW11_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW11_F	Sterile Plastic Bottle - Sodium Tl	----	28-Mar-2019	29-Mar-2019	✗	01-Apr-2019	✗
SW12_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW12_F	Sterile Plastic Bottle - Sodium Tl	----	28-Mar-2019	29-Mar-2019	✗	01-Apr-2019	✗
SW13_E	Sterile Plastic Bottle - Sodium Tl	----	30-Mar-2019	29-Mar-2019	✓	01-Apr-2019	✗
SW13_F	Sterile Plastic Bottle - Sodium Tl	----	28-Mar-2019	29-Mar-2019	✗	01-Apr-2019	✗

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com
- Chain of Custody (CoC) (COC)	Email	AP_CustomerService.ANZ@aecom.com

JAMES PEACHEY

- *AU Certificate of Analysis - NATA (COA)	Email	james.peachey@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	james.peachey@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	james.peachey@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	james.peachey@aecom.com
- A4 - AU Tax Invoice (INV)	Email	james.peachey@aecom.com
- Chain of Custody (CoC) (COC)	Email	james.peachey@aecom.com
- Chromatogram (CHROM)	Email	james.peachey@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	james.peachey@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	james.peachey@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	james.peachey@aecom.com
- EDI Format - XTab (XTAB)	Email	james.peachey@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	james.peachey@aecom.com

ONA KANAS

- *AU Certificate of Analysis - NATA (COA)	Email	ona.kanas@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ona.kanas@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ona.kanas@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ona.kanas@aecom.com
- Chain of Custody (CoC) (COC)	Email	ona.kanas@aecom.com
- Chromatogram (CHROM)	Email	ona.kanas@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	ona.kanas@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	ona.kanas@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	ona.kanas@aecom.com
- EDI Format - XTab (XTAB)	Email	ona.kanas@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	ona.kanas@aecom.com

CERTIFICATE OF ANALYSIS

Work Order : **EB1908167**
Client : **AECOM Australia Pty Ltd**
Contact : JAMES PEACHEY
Address : PO BOX 1307
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : ----
Project : 60597459 1.0
Order number : 60597459 1.0
C-O-C number : ----
Sampler : SEBASTIAN KNIGHT
Site : ----
Quote number : EN/004/16
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 17
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 29-Mar-2019 17:30
Date Analysis Commenced : 29-Mar-2019
Issue Date : 09-Apr-2019 11:18

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*
Anuththara Jayasuriya	Microbiologist	Brisbane Microbiological, Stafford, QLD
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Franco Lentini		Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- MF = membrane filtration
- CFU = colony forming unit
- EP231X-ST: Results for sample EB1908167_019 (QC102) have been confirmed by re-extraction and re-analysis.
- **PFAS Supertrace analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Microbiological Comment: In accordance with ALS work instruction QWI-MIC/04, membrane filtration result is reported an approximate (~) when the count of colonies on the filtered membrane is outside the range of 10 - 100cfu.
- EP231X: Matrix spike shows results out of control limit due to primary sample matrix interference.
- MW006 is ALS's internal code and is equivalent to AS4276.7.
- MW007 is ALS's internal code and is equivalent to AS4276.5.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)	Client sample ID			**SS13**	**PW13**	**SS12**	**PW12**	**SS11**
	Client sampling date / time			27-Mar-2019 14:15	27-Mar-2019 16:15	27-Mar-2019 15:30	27-Mar-2019 15:30	27-Mar-2019 16:30
Compound	CAS Number	LOR	Unit	**EB1908167-002**	**EB1908167-003**	**EB1908167-005**	**EB1908167-006**	**EB1908167-008**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**68.9**	**68.3**	**60.2**	**60.8**	**41.9**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**22**	**18**	**14**	**16**	**6**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**33**	**34**	**23**	**26**	**14**
Copper	7440-50-8	5	mg/kg	**18**	**19**	**12**	**13**	**8**
Lead	7439-92-1	5	mg/kg	**24**	**24**	**14**	**18**	**9**
Nickel	7440-02-0	2	mg/kg	**16**	**16**	**10**	**10**	**7**
Zinc	7440-66-6	5	mg/kg	**54**	**56**	**39**	**44**	**23**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	**60**	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	**110**	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	**170**	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	**80**	**50**	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	**150**	<100	<100	**100**
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	**230**	**50**	<50	**100**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	**80**	**50**	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

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

			Client sample ID	**SS13**	**PW13**	**SS12**	**PW12**	**SS11**
			Client sampling date / time	27-Mar-2019 14:15	27-Mar-2019 16:15	27-Mar-2019 15:30	27-Mar-2019 15:30	27-Mar-2019 16:30
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-002**	**EB1908167-003**	**EB1908167-005**	**EB1908167-006**	**EB1908167-008**
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
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**	**0.0004**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**SS13**	**PW13**	**SS12**	**PW12**	**SS11**
			Client sampling date / time	27-Mar-2019 14:15	27-Mar-2019 16:15	27-Mar-2019 15:30	27-Mar-2019 15:30	27-Mar-2019 16:30
Compound	CAS Number	LOR	Unit	**EB1908167-002**	**EB1908167-003**	**EB1908167-005**	**EB1908167-006**	**EB1908167-008**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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)	24448-09-7	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**	**0.0004**	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0002**	**0.0002**	**0.0002**	**0.0004**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0002**	**0.0002**	**0.0002**	**0.0004**	<0.0002
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**64.6**	**69.5**	**72.1**	**69.8**	**75.1**
Toluene-D8	2037-26-5	0.2	%	**63.4**	**63.8**	**69.9**	**71.0**	**73.3**
4-Bromofluorobenzene	460-00-4	0.2	%	**72.2**	**87.0**	**82.2**	**81.0**	**86.7**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**106**	**107**	**106**	**113**	**116**
13C8-PFOA	----	0.0002	%	**94.0**	**100**	**100**	**103**	**105**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)	*Client sample ID*			**PW11**	**SS10**	**PW10**	**QC100**	**QC101**
	Client sampling date / time			27-Mar-2019 16:30	28-Mar-2019 08:45	28-Mar-2019 08:45	28-Mar-2019 08:45	28-Mar-2019 08:45
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-009**	**EB1908167-011**	**EB1908167-012**	**EB1908167-013**	**EB1908167-014**
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**40.9**	**61.8**	**63.9**	**63.8**	**63.4**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**6**	**18**	**18**	**18**	**16**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**13**	**33**	**31**	**33**	**33**
Copper	7440-50-8	5	mg/kg	**8**	**15**	**14**	**16**	**15**
Lead	7439-92-1	5	mg/kg	**9**	**21**	**22**	**21**	**22**
Nickel	7440-02-0	2	mg/kg	**6**	**16**	**13**	**15**	**14**
Zinc	7440-66-6	5	mg/kg	**22**	**55**	**54**	**56**	**55**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	**50**	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	<50	**50**	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	**50**	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**PW11**	**SS10**	**PW10**	**QC100**	**QC101**
			Client sampling date / time	27-Mar-2019 16:30	28-Mar-2019 08:45	28-Mar-2019 08:45	28-Mar-2019 08:45	28-Mar-2019 08:45
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-009**	**EB1908167-011**	**EB1908167-012**	**EB1908167-013**	**EB1908167-014**
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
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								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**PW11**	**SS10**	**PW10**	**QC100**	**QC101**
			Client sampling date / time	27-Mar-2019 16:30	28-Mar-2019 08:45	28-Mar-2019 08:45	28-Mar-2019 08:45	28-Mar-2019 08:45
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-009**	**EB1908167-011**	**EB1908167-012**	**EB1908167-013**	**EB1908167-014**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
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)	24448-09-7	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**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**71.4**	**63.5**	**77.6**	**63.3**	**63.6**
Toluene-D8	2037-26-5	0.2	%	**65.7**	**60.9**	**72.5**	**66.1**	**61.4**
4-Bromofluorobenzene	460-00-4	0.2	%	**75.7**	**73.0**	**91.8**	**73.3**	**72.3**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**127**	**109**	**106**	**126**	**110**
13C8-PFOA	----	0.0002	%	**100**	**97.5**	**104**	**99.5**	**100**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW13_F**	**SW12_F**	**SW11_F**	**SW10_F**	**SW10_E**
			Client sampling date / time	27-Mar-2019 14:30	27-Mar-2019 15:30	27-Mar-2019 16:30	28-Mar-2019 16:00	29-Mar-2019 07:30
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-001**	**EB1908167-004**	**EB1908167-007**	**EB1908167-010**	**EB1908167-015**
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.001**	**0.001**	<0.001	**0.001**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L	<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW13_F**	**SW12_F**	**SW11_F**	**SW10_F**	**SW10_E**
			Client sampling date / time	27-Mar-2019 14:30	27-Mar-2019 15:30	27-Mar-2019 16:30	28-Mar-2019 16:00	29-Mar-2019 07:30
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-001**	**EB1908167-004**	**EB1908167-007**	**EB1908167-010**	**EB1908167-015**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0012**	**0.0007**	**0.0020**	**0.0012**	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	**0.0012**	**0.0010**	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0040**	**0.0040**	**0.0126**	**0.0088**	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	**0.0007**	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	**0.0073**	**0.0072**	**0.0241**	**0.0160**	**0.0004**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.0015**	**0.0013**	**0.0039**	**0.0035**	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	**0.0007**	**0.0006**	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0008**	**0.0008**	**0.0021**	**0.0017**	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW13_F**	**SW12_F**	**SW11_F**	**SW10_F**	**SW10_E**
			Client sampling date / time	27-Mar-2019 14:30	27-Mar-2019 15:30	27-Mar-2019 16:30	28-Mar-2019 16:00	29-Mar-2019 07:30
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-001**	**EB1908167-004**	**EB1908167-007**	**EB1908167-010**	**EB1908167-015**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums								
Sum of PFAS	----	0.0003	µg/L	**0.0148**	**0.0140**	**0.0473**	**0.0328**	**0.0004**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0003	µg/L	**0.0113**	**0.0112**	**0.0367**	**0.0248**	**0.0004**
Sum of PFAS (WA DER List)	----	0.0003	µg/L	**0.0148**	**0.0140**	**0.0454**	**0.0318**	**0.0004**
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**250**	**160**	**~200**	**~130**	**560**
Escherichia coli	----	1	CFU/100mL	**60**	**30**	**~64**	**~60**	**280**
MW007: Coliforms by MF								
Coliforms	----	1	CFU/100mL	**5700**	**~730**	**1000**	**1800**	**~5700**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**101**	**99.9**	**101**	**98.7**	**98.3**
Toluene-D8	2037-26-5	2	%	**96.4**	**97.8**	**101**	**98.8**	**95.8**
4-Bromofluorobenzene	460-00-4	2	%	**107**	**106**	**112**	**110**	**103**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	**74.6**	**78.5**	**75.0**	**65.1**	**74.2**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW13_F**	**SW12_F**	**SW11_F**	**SW10_F**	**SW10_E**
			Client sampling date / time	27-Mar-2019 14:30	27-Mar-2019 15:30	27-Mar-2019 16:30	28-Mar-2019 16:00	29-Mar-2019 07:30
Compound	CAS Number	LOR	Unit	**EB1908167-001**	**EB1908167-004**	**EB1908167-007**	**EB1908167-010**	**EB1908167-015**
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C8-PFOA	----	0.0005	%	**110**	**120**	**104**	**103**	**103**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW11_E**	**SW12_E**	**SW13_E**	**QC102**	**----**
			Client sampling date / time	29-Mar-2019 07:10	29-Mar-2019 06:50	29-Mar-2019 07:30	29-Mar-2019 07:30	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-016**	**EB1908167-017**	**EB1908167-018**	**EB1908167-019**	**--------**
				Result	Result	Result	Result	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.002**	**0.001**	**0.001**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	**0.001**	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	<100	<100	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	<100	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L	<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L	<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW11_E**	**SW12_E**	**SW13_E**	**QC102**	**----**
			Client sampling date / time	29-Mar-2019 07:10	29-Mar-2019 06:50	29-Mar-2019 07:30	29-Mar-2019 07:30	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-016**	**EB1908167-017**	**EB1908167-018**	**EB1908167-019**	**--------**
				Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0014**	<0.0005	**0.0011**	<0.0005	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	**0.0024**	**0.0010**	**0.0018**	**0.0008**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.0006**	<0.0005	<0.0005	<0.0005	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**SW11_E**	**SW12_E**	**SW13_E**	**QC102**	----
			Client sampling date / time	29-Mar-2019 07:10	29-Mar-2019 06:50	29-Mar-2019 07:30	29-Mar-2019 07:30	----
Compound	*CAS Number*	*LOR*	*Unit*	**EB1908167-016**	**EB1908167-017**	**EB1908167-018**	**EB1908167-019**	--------
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0003	µg/L	**0.0044**	**0.0010**	**0.0029**	**0.0008**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0003	µg/L	**0.0038**	**0.0010**	**0.0029**	**0.0008**	----
Sum of PFAS (WA DER List)	----	0.0003	µg/L	**0.0044**	**0.0010**	**0.0029**	**0.0008**	----
MW006: Faecal Coliforms & E.coli by MF								
Faecal Coliforms	----	1	CFU/100mL	**190**	**290**	**~150**	**480**	----
Escherichia coli	----	1	CFU/100mL	**60**	**70**	**~79**	**320**	----
MW007: Coliforms by MF								
Coliforms	----	1	CFU/100mL	**~2300**	**~1100**	**~730**	**2900**	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**97.3**	**105**	**99.3**	**102**	----
Toluene-D8	2037-26-5	2	%	**96.0**	**99.8**	**98.4**	**98.2**	----
4-Bromofluorobenzene	460-00-4	2	%	**106**	**111**	**110**	**104**	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	**71.6**	**71.6**	**62.5**	**82.7**	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW11_E**	**SW12_E**	**SW13_E**	**QC102**	**----**
			Client sampling date / time	29-Mar-2019 07:10	29-Mar-2019 06:50	29-Mar-2019 07:30	29-Mar-2019 07:30	----
Compound	CAS Number	LOR	Unit	**EB1908167-016**	**EB1908167-017**	**EB1908167-018**	**EB1908167-019**	**--------**
				Result	Result	Result	Result	----
EP231S: PFAS Surrogate - Continued								
13C8-PFOA	----	0.0005	%	**114**	**90.3**	**102**	**95.5**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	53	134
Toluene-D8	2037-26-5	60	131
4-Bromofluorobenzene	460-00-4	59	127
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130
13C8-PFOA	----	70	130

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

QUALITY CONTROL REPORT

Work Order	: **EB1908167**	Page	: 1 of 16
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 29-Mar-2019
Order number	: 60597459 1.0	Date Analysis Commenced	: 29-Mar-2019
C-O-C number	: ----	Issue Date	: 09-Apr-2019
Sampler	: SEBASTIAN KNIGHT		
Site	: ----		
Quote number	: EN/004/16		
No. of samples received	: 19		
No. of samples analysed	: 19		

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*
Anuththara Jayasuriya	Microbiologist	Brisbane Microbiological, Stafford, QLD
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Franco Lentini		Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD

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 (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2268600)									
EB1908167-002	SS13	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	33	32	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	16	17	6.48	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	22	19	14.2	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	18	18	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	22	9.25	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	54	52	2.95	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2268658)									
EB1908167-002	SS13	EA055: Moisture Content	----	0.1	%	68.9	68.4	0.752	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2268599)									
EB1908167-002	SS13	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2268601)									
EB1908167-002	SS13	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2268640)									
EB1908167-002	SS13	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2268601)									
EB1908167-002	SS13	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2268640)									
EB1908167-002	SS13	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

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: 2268601)									
EB1908167-002	SS13	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2268878)									
EB1908161-060	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	0.0004	0.0003	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB1908167-014	QC101	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2268878)									
EB1908161-060	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EB1908167-014	QC101	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2268878) - continued									
EB1908167-014	QC101	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: 2268878)									
EB1908161-060	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)	24448-09-7	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
EB1908167-014	QC101	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)	24448-09-7	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: 2268878)									
EB1908161-060	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
EB1908167-014	QC101	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2268878) - continued									
EB1908167-014	QC101	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 2268709)									
EB1908125-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.018	0.017	0.00	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.011	0.012	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.027	0.027	0.00	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.026	0.026	0.00	No Limit
EB1908133-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.010	0.009	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.150	0.146	2.68	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 2268713)									
EB1908167-018	SW13_E	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EB1908173-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.004	29.2	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.018	0.017	6.44	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.016	0.012	30.6	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.009	0.007	25.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.046	0.033	31.3	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2268714)									
EB1908155-013	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.1 µg/L	<0.0001	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 (%)*
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2268714) - continued									
EB1908167-010	SW10_F	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2271063)									
EB1908167-001	SW13_F	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EB1908225-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2274116)									
EB1907980-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2275715)									
EB1907943-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	390	470	18.5	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	340	380	11.7	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2271063)									
EB1908167-001	SW13_F	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EB1908225-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2274116)									
EB1907980-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2275715)									
EB1907943-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	480	560	14.3	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	260	330	21.4	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080: BTEXN (QC Lot: 2271063)									
EB1908167-001	SW13_F	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EB1908225-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2273676)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2273676) - continued									
EB1908167-001	SW13_F	EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	0.0073	0.0067	8.30	0% - 20%
		EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0012	0.0010	12.6	No Limit
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0040	0.0037	8.88	No Limit
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2273676)									
EB1908167-001	SW13_F	EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0015	0.0013	12.8	No Limit
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0008	0.0008	0.00	No Limit
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2273676)									
EB1908167-001	SW13_F	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2273676)									

Sub-Matrix: **WATER**

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: 2273676) - continued									
EB1908167-001	SW13_F	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2273676)									
EB1908167-001	SW13_F	EP231X-ST: Sum of PFAS	----	0.0003	µg/L	0.0148	0.0135	9.19	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
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2268600)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	100.18035 mg/kg	100.0	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
EG005T: Chromium	7440-47-3	2	mg/kg	<2	15.72303 mg/kg	124	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	48.20738 mg/kg	104	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	51.84403 mg/kg	109	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	12.39646 mg/kg	113	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	118.96974 mg/kg	104	87	127
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2268599)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.0847 mg/kg	91.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2268601)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	16 mg/kg	94.2	60	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2268640)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	310 mg/kg	97.0	79	123
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	490 mg/kg	91.8	77	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2268601)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	18.5 mg/kg	98.8	58	124
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2268640)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	450 mg/kg	95.4	81	122
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	320 mg/kg	93.0	74	122
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080: BTEXN (QCLot: 2268601)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.0	67	115
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	91.0	69	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	92.3	69	116
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	92.2	70	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	88.8	72	116
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	88.0	73	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2268878)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	89.5	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00117 mg/kg	103	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	97.9	70	130

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*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2268878) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	102	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	101	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	100	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2268878)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	88.9	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.0	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2268878)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.3	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	74.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.1	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	70	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.6	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2268878)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00116 mg/kg	97.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	93.6	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00119 mg/kg	101	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	96.2	70	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 2268709)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	88	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.8	88	111

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2268709) - continued								
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	107	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.0	89	112
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	107	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	103	84	114
EG020T: Total Metals by ICP-MS (QCLot: 2268713)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.4	88	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.8	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.5	89	112
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	88	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	97.3	84	114
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2268714)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.6	84	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2271063)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	160 µg/L	99.6	67	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2274116)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	83.0	65	135
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	92.2	62	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2275715)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	113	65	135
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	112	62	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2271063)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	185 µg/L	101	66	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2274116)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	88.7	66	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	88.8	61	139
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2275715)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	114	66	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	115	61	139
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP080: BTEXN (QCLot: 2271063)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	95.0	73	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	98.0	75	119
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	98.0	73	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	101	77	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	97.6	76	121
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	111	75	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2273676)								
EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.01 µg/L	103	50	130
EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.01 µg/L	119	50	130
EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.01 µg/L	122	50	130
EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.01 µg/L	112	50	130
EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	<0.0003	0.01 µg/L	98.6	50	130
EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.01 µg/L	51.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2273676)								
EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	0.05 µg/L	80.4	30	130
EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.01 µg/L	125	50	130
EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.01 µg/L	128	50	130
EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.01 µg/L	110	50	130
EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.01 µg/L	122	50	130
EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.01 µg/L	113	50	130
EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.01 µg/L	98.6	50	130
EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	56.4	40	130
EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.01 µg/L	57.6	40	130
EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	40.6	40	130
EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.025 µg/L	50.9	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2273676)								
EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.01 µg/L	60.2	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.025 µg/L	50.7	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.025 µg/L	46.6	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.025 µg/L	51.0	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.025 µg/L	45.4	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.01 µg/L	57.4	40	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2273676) - continued								
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.01 µg/L	40.2	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2273676)								
EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.01 µg/L	123	50	130
EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.01 µg/L	128	50	130
EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.01 µg/L	118	50	130
EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.01 µg/L	70.0	50	130
EP231P: PFAS Sums (QCLot: 2273676)								
EP231X-ST: Sum of PFAS	----	0.0003	µg/L	<0.0003	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2268600)							
EB1908167-003	PW13	EG005T: Arsenic	7440-38-2	50 mg/kg	86.2	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	93.8	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	92.6	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	93.4	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	92.3	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	86.0	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	89.6	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2268599)							
EB1908167-003	PW13	EG035T: Mercury	7439-97-6	5 mg/kg	88.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2268601)							
EB1908167-003	PW13	EP080: C6 - C9 Fraction	----	8 mg/kg	83.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2268640)							
EB1908167-003	PW13	EP071: C10 - C14 Fraction	----	310 mg/kg	94.9	70	130
		EP071: C15 - C28 Fraction	----	490 mg/kg	88.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2268601)							
EB1908167-003	PW13	EP080: C6 - C10 Fraction	C6_C10	8 mg/kg	85.8	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2268640)							
EB1908167-003	PW13	EP071: >C10 - C16 Fraction	----	450 mg/kg	93.5	70	130
		EP071: >C16 - C34 Fraction	----	320 mg/kg	85.3	70	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2268601)							
EB1908167-003	PW13	EP080: Benzene	71-43-2	2 mg/kg	75.9	70	130
		EP080: Toluene	108-88-3	2 mg/kg	81.1	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2268878)							
EB1908167-002	SS13	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	81.2	70	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	86.4	70	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	83.6	70	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	85.2	70	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	94.0	70	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	# 32.4	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2268878)							
EB1908167-002	SS13	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	73.6	70	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	87.6	70	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	100	70	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	91.2	70	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	95.2	70	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	86.8	70	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	91.6	70	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	87.2	70	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	109	70	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	76.4	70	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	84.8	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2268878)							
EB1908167-002	SS13	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	91.6	70	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	74.0	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	97.4	70	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	71.2	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	71.2	70	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	104	70	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	85.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2268878)							
EB1908167-002	SS13	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	90.0	70	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	90.0	70	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	91.2	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2268878) - continued							
EB1908167-002	SS13	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	70.4	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 2268709)							
EB1908133-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	91.3	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	93.6	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.6	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	96.0	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	101	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	97.9	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	94.2	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2268713)							
EB1908167-019	QC102	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.0	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	94.5	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.6	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	96.5	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	103	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.5	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	94.3	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2268714)							
EB1908125-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	89.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2271063)							
EB1908167-004	SW12_F	EP080: C6 - C9 Fraction	----	40 µg/L	97.9	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2274116)							
EB1907980-001	Anonymous	EP071: C10 - C14 Fraction	----	1070 µg/L	86.5	49	134
		EP071: C15 - C28 Fraction	----	1770 µg/L	87.1	50	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2271063)							
EB1908167-004	SW12_F	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	102	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2274116)							
EB1907980-001	Anonymous	EP071: >C10 - C16 Fraction	----	1560 µg/L	88.4	43	119
		EP071: >C16 - C34 Fraction	----	1190 µg/L	83.8	38	114
EP080: BTEXN (QCLot: 2271063)							
EB1908167-004	SW12_F	EP080: Benzene	71-43-2	10 µg/L	99.5	70	130
		EP080: Toluene	108-88-3	10 µg/L	97.4	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2273676)							

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: 2273676) - continued							
EB1908167-004	SW12_F	EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.01 µg/L	114	50	130
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.01 µg/L	111	50	130
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01 µg/L	124	50	130
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.01 µg/L	96.2	50	130
		EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01 µg/L	72.0	50	130
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.01 µg/L	42.4	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2273676)							
EB1908167-004	SW12_F	EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.05 µg/L	65.0	30	130
		EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.01 µg/L	112	50	130
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.01 µg/L	116	50	130
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.01 µg/L	106	50	130
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.01 µg/L	116	50	130
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.01 µg/L	112	50	130
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.01 µg/L	80.6	50	130
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.01 µg/L	52.0	30	130
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.01 µg/L	42.8	30	130
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01 µg/L	40.4	30	130
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.025 µg/L	41.7	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2273676)							
EB1908167-004	SW12_F	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.01 µg/L	37.6	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.025 µg/L	38.0	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.025 µg/L	31.9	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.025 µg/L	37.7	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.025 µg/L	31.7	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.01 µg/L	35.4	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.01 µg/L	31.2	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2273676)							
EB1908167-004	SW12_F	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.01 µg/L	121	50	130
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.01 µg/L	119	50	130
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.01 µg/L	99.8	50	130
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.01 µg/L	66.8	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1908167**	Page	: 1 of 14
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Brisbane
Contact	: JAMES PEACHEY	Telephone	: +61 7 3552 8616
Project	: 60597459 1.0	Date Samples Received	: 29-Mar-2019
Site	: ----	Issue Date	: 09-Apr-2019
Sampler	: SEBASTIAN KNIGHT	No. of samples received	: 19
Order number	: 60597459 1.0	No. of samples analysed	: 19

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EB1908167--002	SS13	**Perfluorodecane sulfonic acid (PFDS)**	335-77-3	32.4 %	70-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	**Days overdue**	*Date analysed*	*Due for analysis*	**Days overdue**
MW006: Faecal Coliforms & E.coli by MF							
Sterile Plastic Bottle - Sodium Thiosulfate SW13_F, SW11_F	SW12_F,	----	----	----	29-Mar-2019	28-Mar-2019	**1**
MW007: Coliforms by MF							
Sterile Plastic Bottle - Sodium Thiosulfate SW13_F, SW11_F	SW12_F,	----	----	----	30-Mar-2019	28-Mar-2019	**2**
Sterile Plastic Bottle - Sodium Thiosulfate SW10_F		----	----	----	30-Mar-2019	29-Mar-2019	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	2	38	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	1	38	2.63	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

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

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 (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) SS13, SS11	SS12,	**27-Mar-2019**	**----**	----	----	**01-Apr-2019**	10-Apr-2019	✓
HDPE Soil Jar (EA055) SS10,	QC100	**28-Mar-2019**	**----**	----	----	**01-Apr-2019**	11-Apr-2019	✓
Soil Glass Jar - Unpreserved (EA055) PW13, PW11	PW12,	**27-Mar-2019**	**----**	----	----	**01-Apr-2019**	10-Apr-2019	✓
Soil Glass Jar - Unpreserved (EA055) PW10,	QC101	**28-Mar-2019**	**----**	----	----	**01-Apr-2019**	11-Apr-2019	✓
EG005(ED093)T: Total Metals by ICP-AES								
HDPE Soil Jar (EG005T) SS13, SS11	SS12,	**27-Mar-2019**	**02-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
HDPE Soil Jar (EG005T) SS10,	QC100	**28-Mar-2019**	**02-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
Soil Glass Jar - Unpreserved (EG005T) PW13, PW11	PW12,	**27-Mar-2019**	**02-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
Soil Glass Jar - Unpreserved (EG005T) PW10,	QC101	**28-Mar-2019**	**02-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
HDPE Soil Jar (EG035T) SS13, SS11	SS12,	**27-Mar-2019**	**02-Apr-2019**	24-Apr-2019	✓	**03-Apr-2019**	24-Apr-2019	✓
HDPE Soil Jar (EG035T) SS10,	QC100	**28-Mar-2019**	**02-Apr-2019**	25-Apr-2019	✓	**03-Apr-2019**	25-Apr-2019	✓
Soil Glass Jar - Unpreserved (EG035T) PW13, PW11	PW12,	**27-Mar-2019**	**02-Apr-2019**	24-Apr-2019	✓	**03-Apr-2019**	24-Apr-2019	✓
Soil Glass Jar - Unpreserved (EG035T) PW10,	QC101	**28-Mar-2019**	**02-Apr-2019**	25-Apr-2019	✓	**03-Apr-2019**	25-Apr-2019	✓

Matrix: **SOIL**

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

Method		***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*			***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP080/071: Total Petroleum Hydrocarbons								
HDPE Soil Jar (EP080) SS13, SS11	SS12,	**27-Mar-2019**	**01-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
HDPE Soil Jar (EP071) SS13, SS11	SS12,	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
HDPE Soil Jar (EP080) SS10,	QC100	**28-Mar-2019**	**01-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
HDPE Soil Jar (EP071) SS10,	QC100	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
Soil Glass Jar - Unpreserved (EP080) PW13, PW11	PW12,	**27-Mar-2019**	**01-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
Soil Glass Jar - Unpreserved (EP071) PW13, PW11	PW12,	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
Soil Glass Jar - Unpreserved (EP080) PW10,	QC101	**28-Mar-2019**	**01-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
Soil Glass Jar - Unpreserved (EP071) PW10,	QC101	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
HDPE Soil Jar (EP080) SS13, SS11	SS12,	**27-Mar-2019**	**01-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
HDPE Soil Jar (EP071) SS13, SS11	SS12,	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
HDPE Soil Jar (EP080) SS10,	QC100	**28-Mar-2019**	**01-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
HDPE Soil Jar (EP071) SS10,	QC100	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
Soil Glass Jar - Unpreserved (EP080) PW13, PW11	PW12,	**27-Mar-2019**	**01-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
Soil Glass Jar - Unpreserved (EP071) PW13, PW11	PW12,	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓
Soil Glass Jar - Unpreserved (EP080) PW10,	QC101	**28-Mar-2019**	**01-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
Soil Glass Jar - Unpreserved (EP071) PW10,	QC101	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**05-Apr-2019**	12-May-2019	✓

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*
EP080: BTEXN							
HDPE Soil Jar (EP080) SS13, SS12, SS11	**27-Mar-2019**	**01-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
HDPE Soil Jar (EP080) SS10, QC100	**28-Mar-2019**	**01-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
Soil Glass Jar - Unpreserved (EP080) PW13, PW12, PW11	**27-Mar-2019**	**01-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
Soil Glass Jar - Unpreserved (EP080) PW10, QC101	**28-Mar-2019**	**01-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS13, SS12, SS11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
HDPE Soil Jar (EP231X) SS10, QC100	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW13, PW12, PW11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW10, QC101	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS13, SS12, SS11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
HDPE Soil Jar (EP231X) SS10, QC100	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW13, PW12, PW11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW10, QC101	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS13, SS12, SS11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
HDPE Soil Jar (EP231X) SS10, QC100	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW13, PW12, PW11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW10, QC101	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓

Matrix: **SOIL**

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

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation* ***Date extracted***	 *Due for extraction*	 *Evaluation*	*Analysis* ***Date analysed***	 *Due for analysis*	 *Evaluation*
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS13, SS12, SS11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
HDPE Soil Jar (EP231X) SS10, QC100	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW13, PW12, PW11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW10, QC101	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS13, SS12, SS11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
HDPE Soil Jar (EP231X) SS10, QC100	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW13, PW12, PW11	**27-Mar-2019**	**01-Apr-2019**	23-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓
Soil Glass Jar - Unpreserved (EP231X) PW10, QC101	**28-Mar-2019**	**01-Apr-2019**	24-Sep-2019	✓	**02-Apr-2019**	11-May-2019	✓

Matrix: **WATER**

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

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation* ***Date extracted***	 *Due for extraction*	 *Evaluation*	*Analysis* ***Date analysed***	 *Due for analysis*	 *Evaluation*
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) SW10_F	**28-Mar-2019**	**03-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**03-Apr-2019**	25-Sep-2019	✓	**03-Apr-2019**	25-Sep-2019	✓

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*
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**----**	----	----	**03-Apr-2019**	24-Apr-2019	✓
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) SW10_F	**28-Mar-2019**	**----**	----	----	**03-Apr-2019**	25-Apr-2019	✓
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**----**	----	----	**03-Apr-2019**	26-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	03-Apr-2019	✓	**03-Apr-2019**	13-May-2019	✓
Amber Glass Bottle - Unpreserved (EP071) SW10_F	**28-Mar-2019**	**04-Apr-2019**	04-Apr-2019	✓	**04-Apr-2019**	14-May-2019	✓
Amber Glass Bottle - Unpreserved (EP071) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**04-Apr-2019**	05-Apr-2019	✓	**04-Apr-2019**	14-May-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW10_F	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**02-Apr-2019**	12-Apr-2019	✓	**02-Apr-2019**	12-Apr-2019	✓

Matrix: **WATER**

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

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	03-Apr-2019	✓	**03-Apr-2019**	13-May-2019	✓
Amber Glass Bottle - Unpreserved (EP071) SW10_F	**28-Mar-2019**	**04-Apr-2019**	04-Apr-2019	✓	**04-Apr-2019**	14-May-2019	✓
Amber Glass Bottle - Unpreserved (EP071) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**04-Apr-2019**	05-Apr-2019	✓	**04-Apr-2019**	14-May-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW10_F	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**02-Apr-2019**	12-Apr-2019	✓	**02-Apr-2019**	12-Apr-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**02-Apr-2019**	10-Apr-2019	✓	**02-Apr-2019**	10-Apr-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW10_F	**28-Mar-2019**	**02-Apr-2019**	11-Apr-2019	✓	**02-Apr-2019**	11-Apr-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**02-Apr-2019**	12-Apr-2019	✓	**02-Apr-2019**	12-Apr-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-ST) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_F	**28-Mar-2019**	**03-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**03-Apr-2019**	25-Sep-2019	✓	**03-Apr-2019**	25-Sep-2019	✓

Matrix: **WATER**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-ST) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_F	**28-Mar-2019**	**03-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**03-Apr-2019**	25-Sep-2019	✓	**03-Apr-2019**	25-Sep-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-ST) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_F	**28-Mar-2019**	**03-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**03-Apr-2019**	25-Sep-2019	✓	**03-Apr-2019**	25-Sep-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-ST) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_F	**28-Mar-2019**	**03-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**03-Apr-2019**	25-Sep-2019	✓	**03-Apr-2019**	25-Sep-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-ST) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**03-Apr-2019**	23-Sep-2019	✓	**03-Apr-2019**	23-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_F	**28-Mar-2019**	**03-Apr-2019**	24-Sep-2019	✓	**03-Apr-2019**	24-Sep-2019	✓
HDPE (no PTFE) (EP231X-ST) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**03-Apr-2019**	25-Sep-2019	✓	**03-Apr-2019**	25-Sep-2019	✓

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*
MW006: Faecal Coliforms & E.coli by MF							
Sterile Plastic Bottle - Sodium Thiosulfate (MW006) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**----**	----	----	**29-Mar-2019**	28-Mar-2019	✗
Sterile Plastic Bottle - Sodium Thiosulfate (MW006) SW10_F	**28-Mar-2019**	**----**	----	----	**29-Mar-2019**	29-Mar-2019	✓
Sterile Plastic Bottle - Sodium Thiosulfate (MW006) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**----**	----	----	**29-Mar-2019**	30-Mar-2019	✓
MW007: Coliforms by MF							
Sterile Plastic Bottle - Sodium Thiosulfate (MW007) SW13_F, SW12_F, SW11_F	**27-Mar-2019**	**----**	----	----	**30-Mar-2019**	28-Mar-2019	✗
Sterile Plastic Bottle - Sodium Thiosulfate (MW007) SW10_F	**28-Mar-2019**	**----**	----	----	**30-Mar-2019**	29-Mar-2019	✗
Sterile Plastic Bottle - Sodium Thiosulfate (MW007) SW10_E, SW11_E, SW12_E, SW13_E, QC102	**29-Mar-2019**	**----**	----	----	**30-Mar-2019**	30-Mar-2019	✓

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	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	**10.00**	**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*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	28	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	38	**5.26**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	9	**11.11**	**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 Control Samples (LCS) - Continued							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	38	**2.63**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

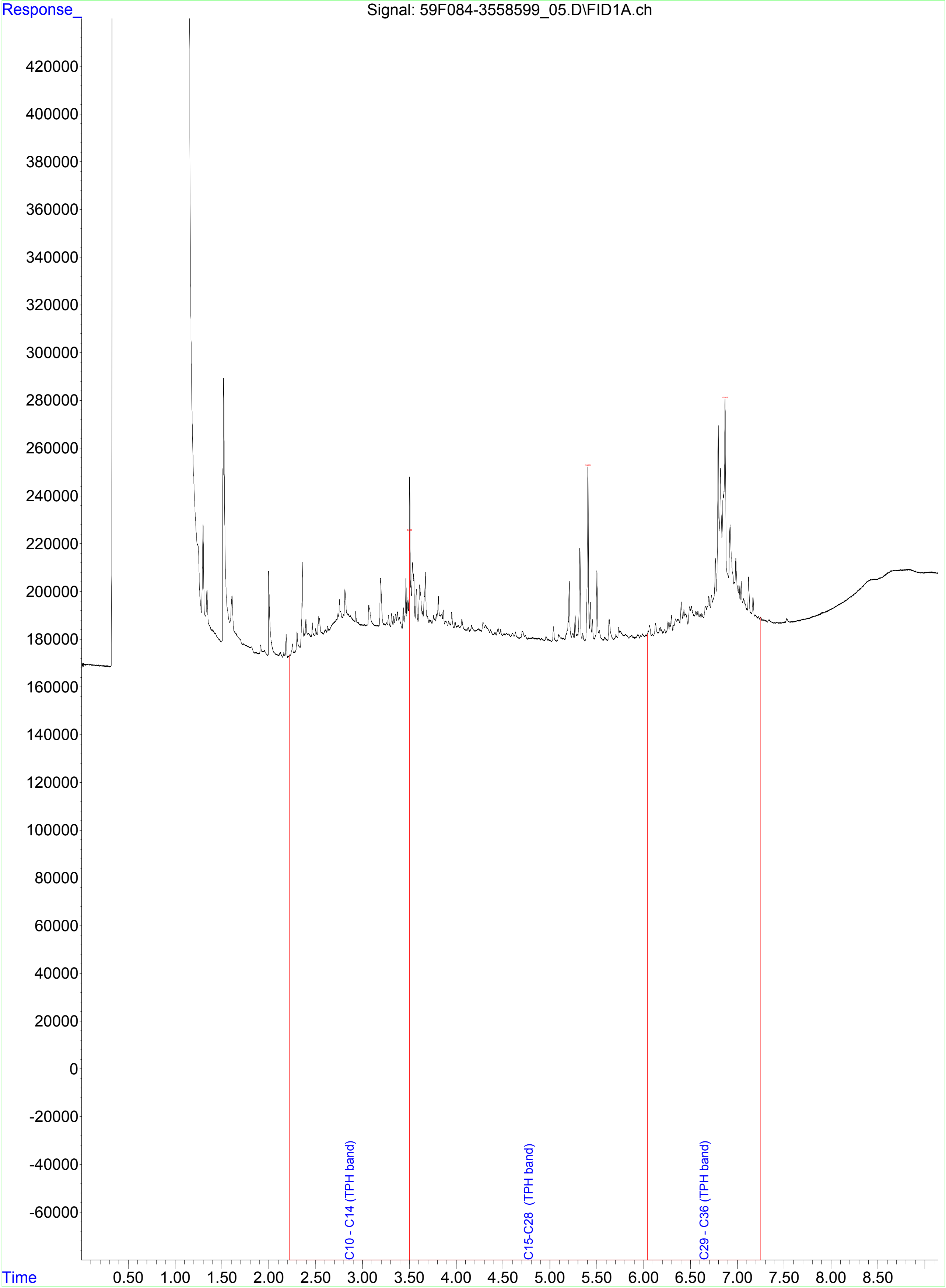
The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
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)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
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. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by 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)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction and LC-Electrospray-MS-MS, Negative Mode using MRM. This method is targeted to pristine environmental and drinking waters reporting at sub-parts per trillion. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1
Thermotolerant Coliforms & E.coli by Membrane Filtration	MW006	WATER	AS 4276.7 2007
Coliforms by Membrane Filtration	MW007	WATER	AS 4276.5 - 2007

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

```
Fraction Scheme   : Legacy Fractions
Data File         : 59F084-3558599_05.D
Laboratory Number: EB1908167-003
Sample ID         : PW13
Date Acquired     : 06-Apr-2019, 08:21:43
```



```
Fraction Scheme   : Legacy Fractions
Data File         : 61F086-3558599_07.D
Laboratory Number: EB1908167-005
Sample ID         : SS12
Date Acquired     : 06-Apr-2019, 08:56:17
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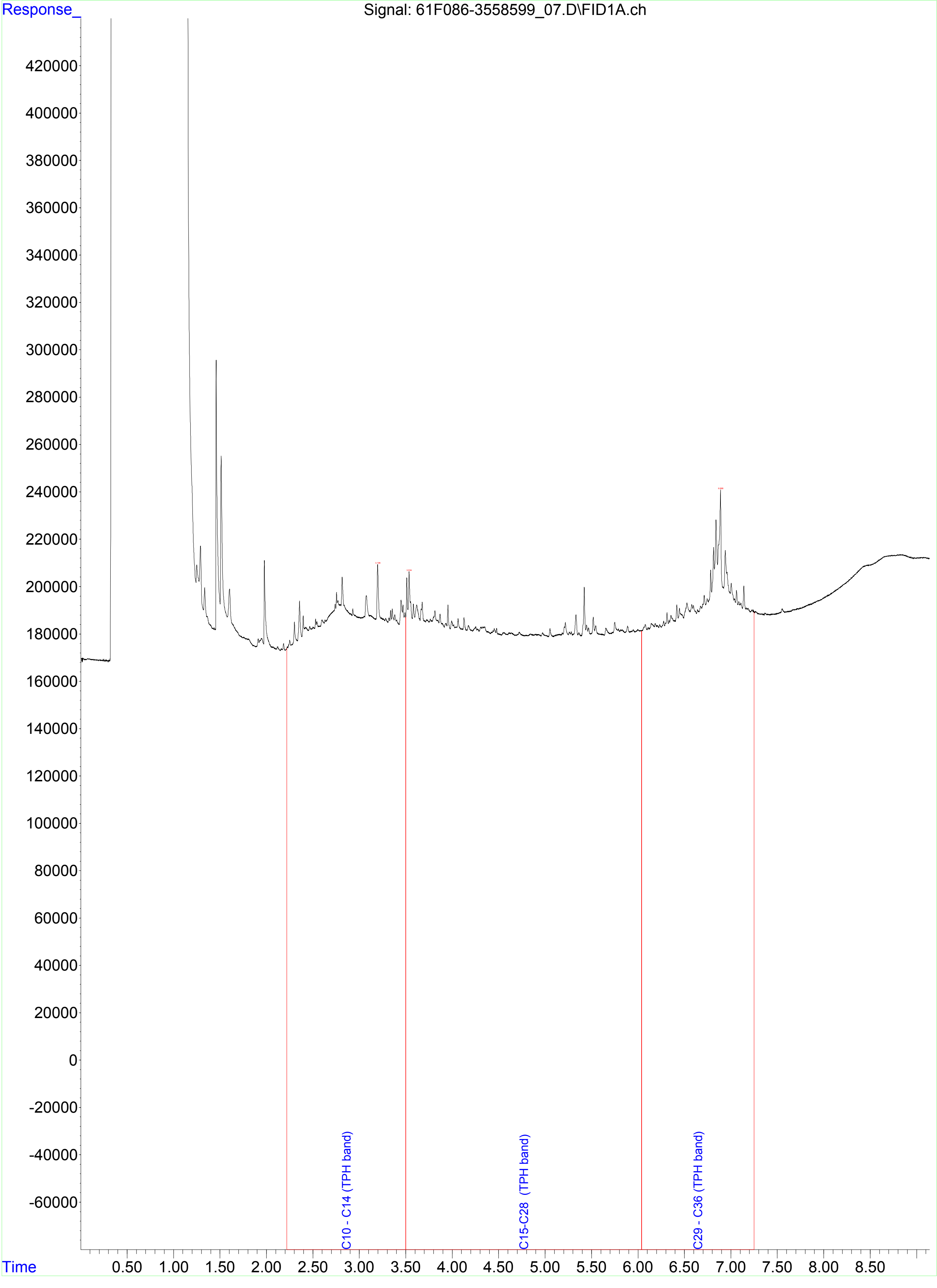

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Fraction Scheme   : Legacy Fractions
Data File         : 63F088-3558599_09.D
Laboratory Number: EB1908167-008
Sample ID         : SS11
Date Acquired     : 06-Apr-2019, 09:31:07
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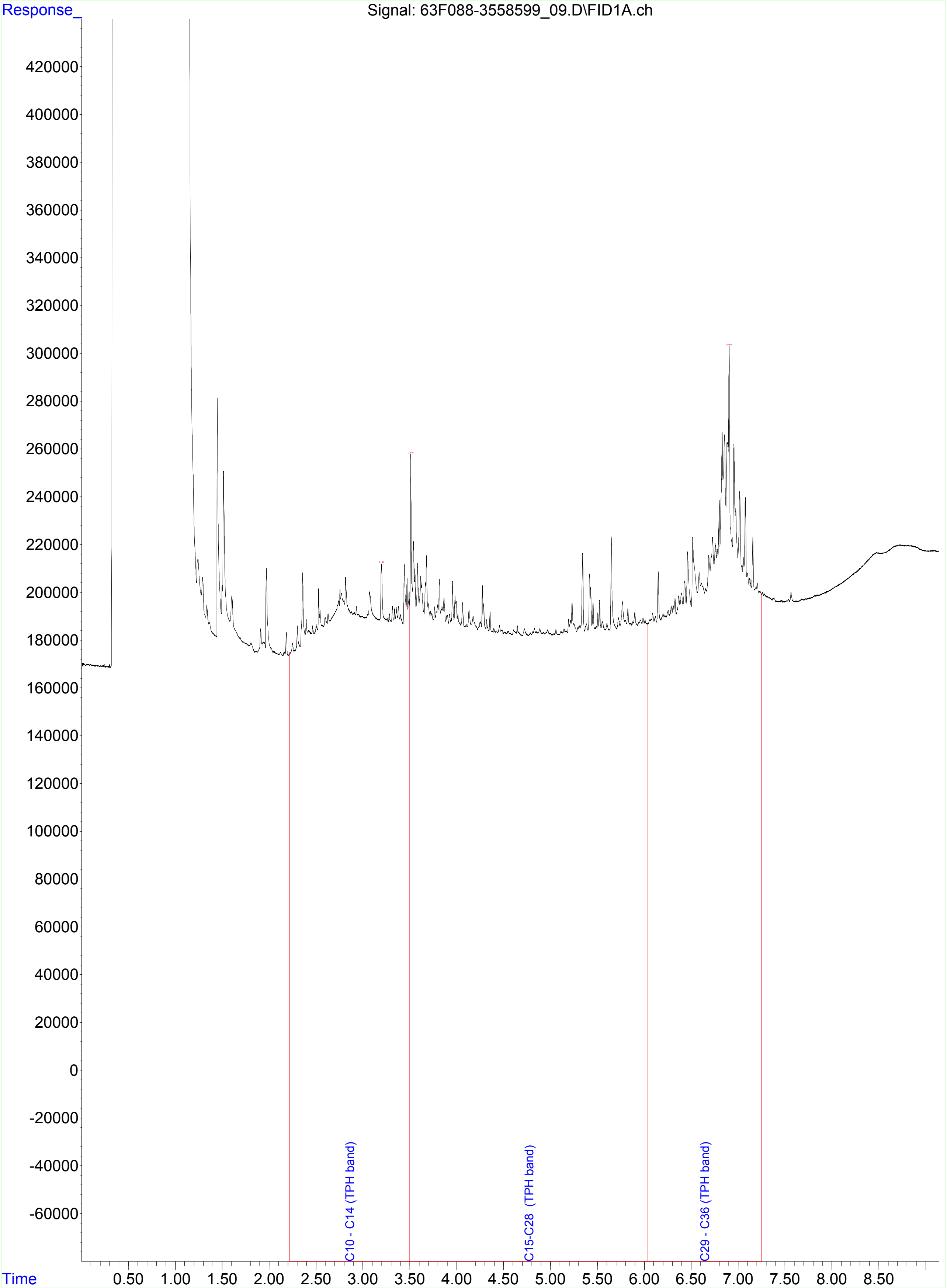

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Fraction Scheme   : Legacy Fractions
Data File         : 66F091-3558599_12.D
Laboratory Number: EB1908167-012
Sample ID         : PW10
Date Acquired     : 06-Apr-2019, 10:22:47
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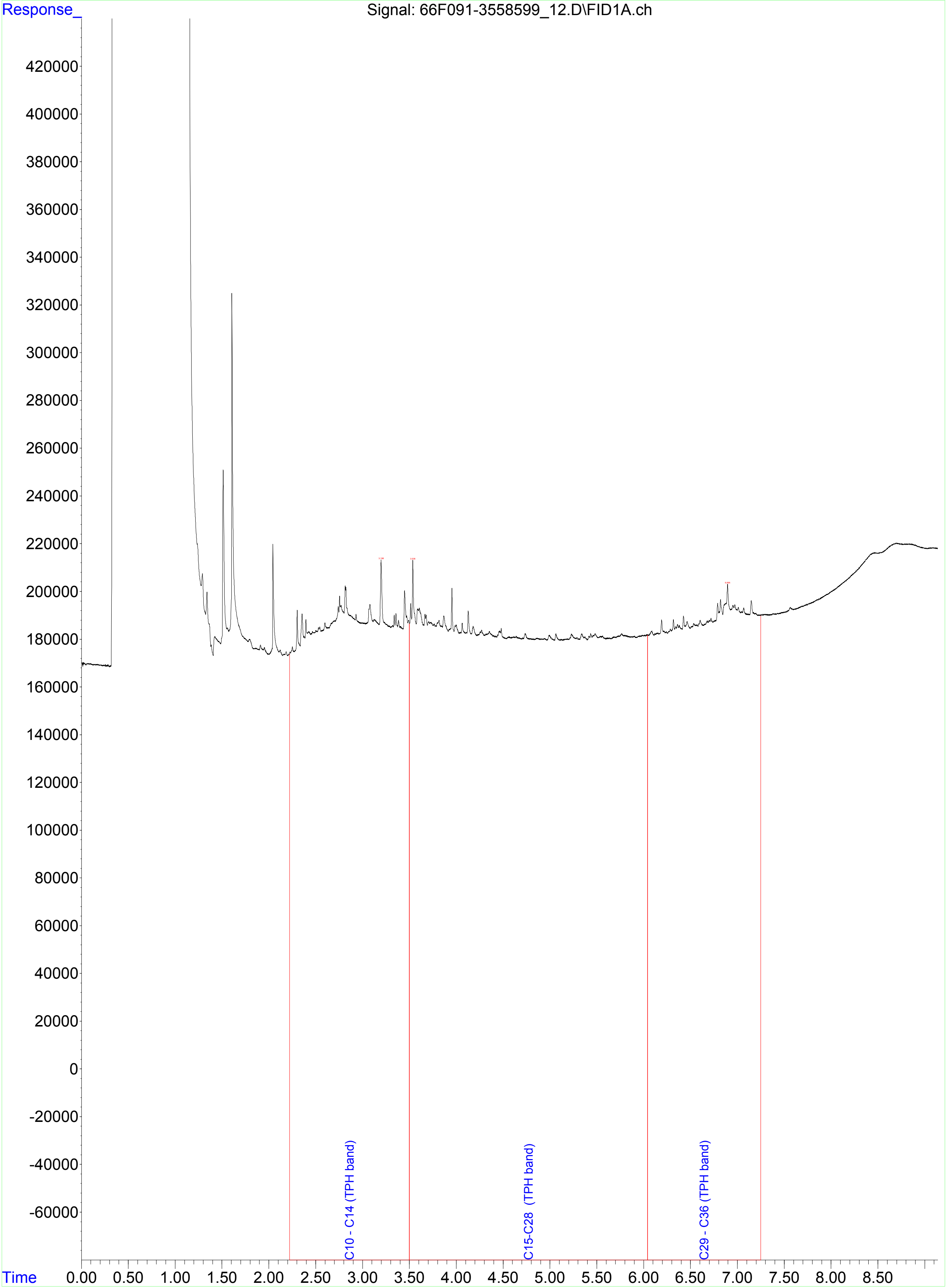

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Data File         : 59F084-3558599_05.D
Laboratory Number: EB1908167-003
Sample ID         : PW13
Date Acquired     : 06-Apr-2019, 08:21:43
```
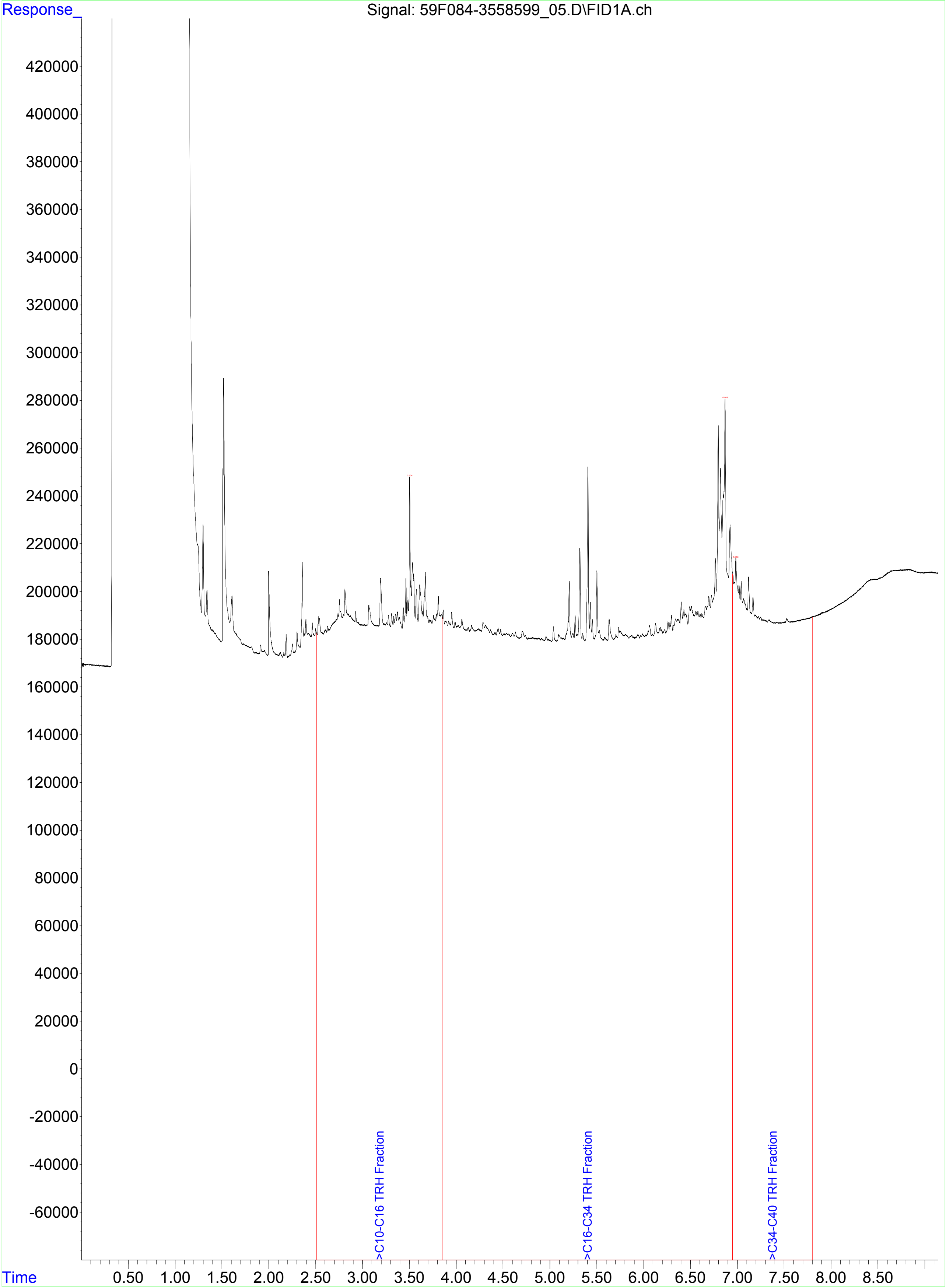
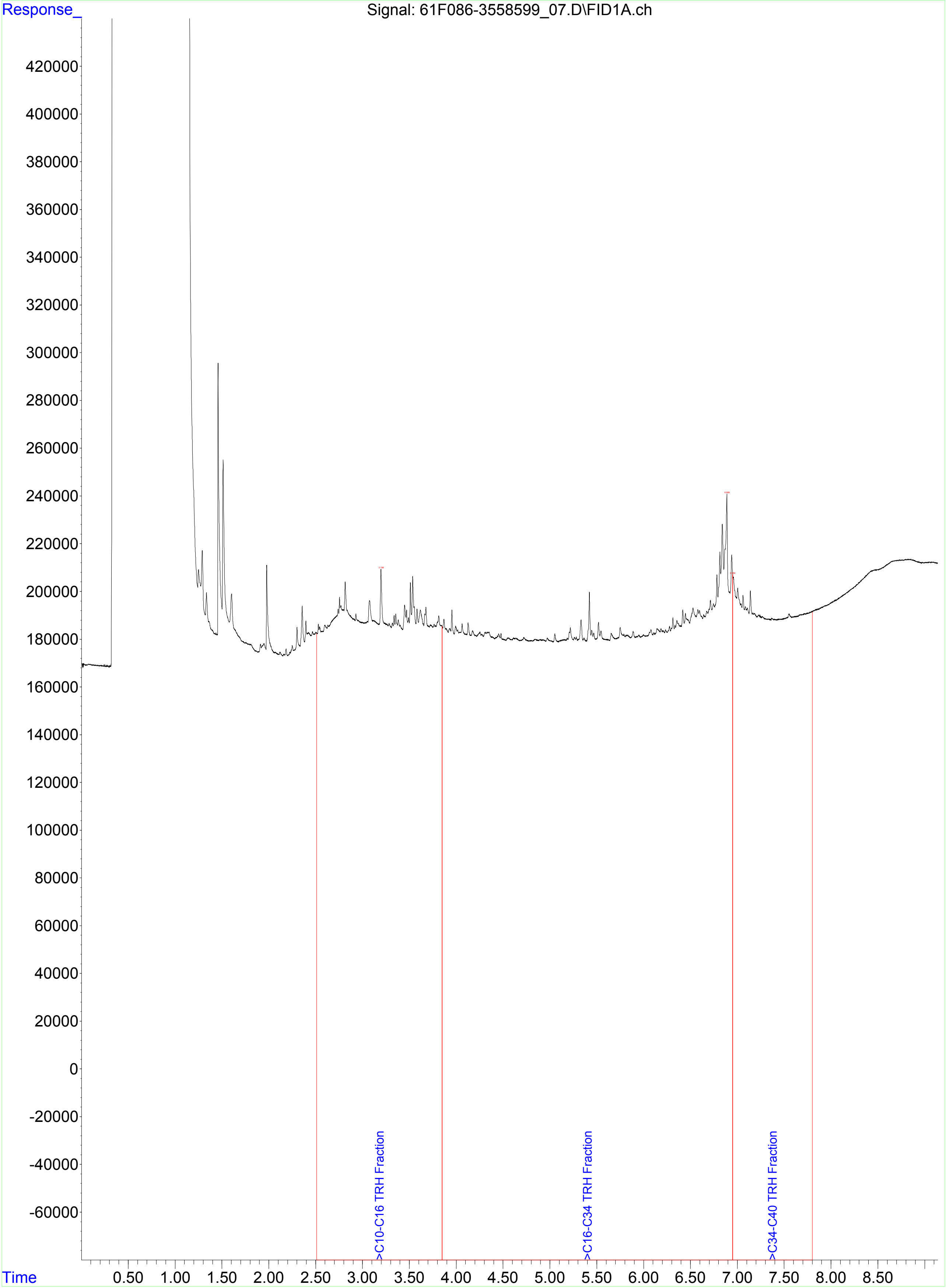
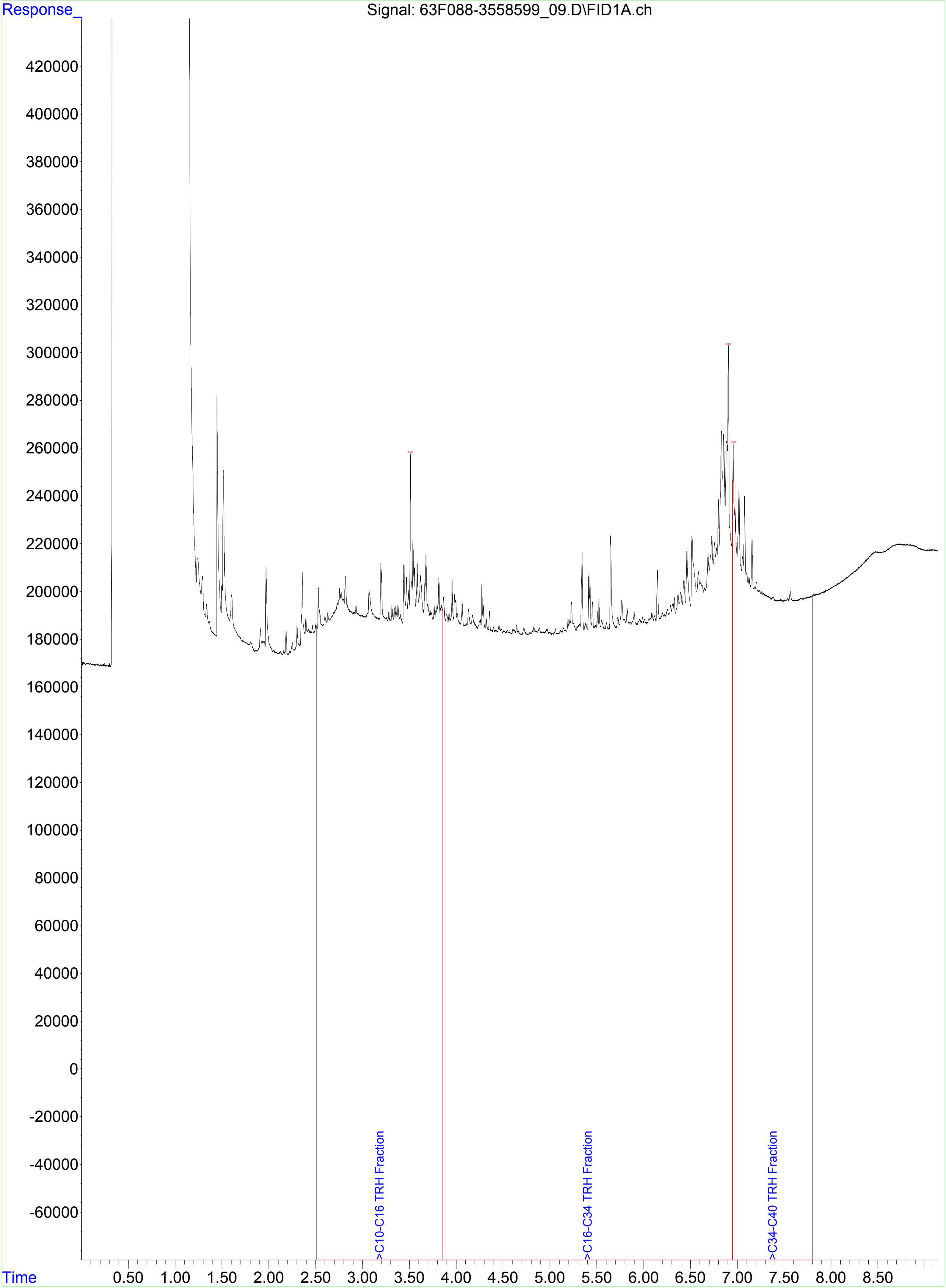



```
Fraction Scheme    : NEPM  Fractions
Data File          : 61F086-3558599_07.D
Laboratory Number: EB1908167-005
Sample ID          : SS12
Date Acquired      : 06-Apr-2019, 08:56:17
```



```
Fraction Scheme    : NEPM  Fractions
Data File          : 63F088-3558599_09.D
Laboratory Number: EB1908167-008
Sample ID          : SS11
Date Acquired      : 06-Apr-2019, 09:31:07
```



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Fraction Scheme    : NEPM  Fractions
Data File          : 66F091-3558599_12.D
Laboratory Number: EB1908167-012
Sample ID          : PW10
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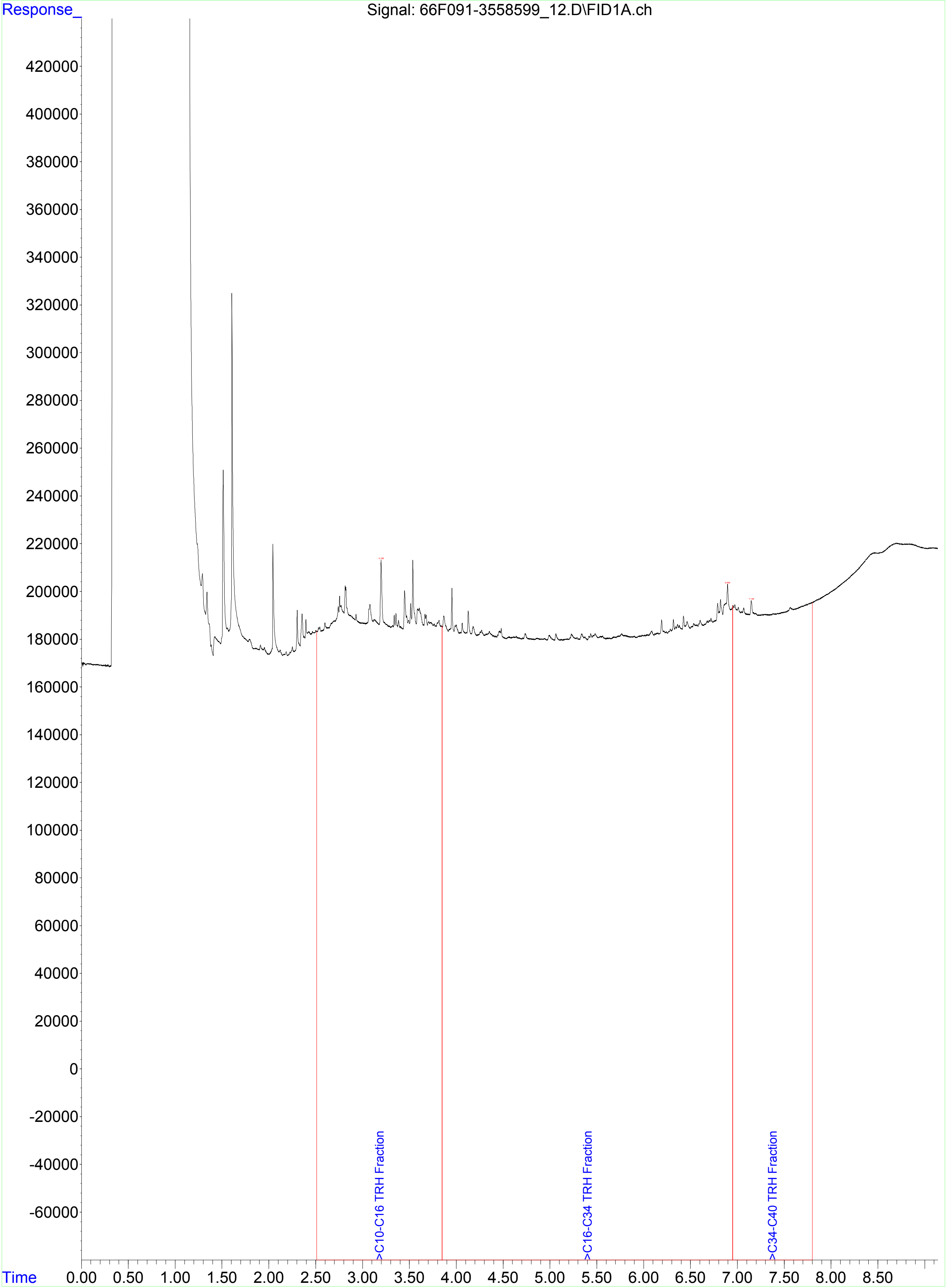

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

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☐MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com

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☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

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

CLIENT: AECOM

OFFICE:

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey

CONTACT PH:

SAMPLER: Camden McCosker

SAMPLER MOBILE: 0499 990 214

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com

Email Invoice to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com

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

☑ Standard TAT **(List due date):**

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: [✓ 1] 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Camden	6.5°C		
DATE/TIME:	DATE/TIME: 11/6/19 12:30pm	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please Forward to Eurofins with the COC

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	EP231-X (PFAS 28)	NT-1S (Cations - Ca/Mg/Na/K)	NT-2S (Anions (Cl/SO4))	HCO3	PO4	L.	S-5 (TRGH/BTEXN/8 Metals)	S-18 (TRH C6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	QC205_190605	5/6/19	W	1 metals 1 SVOC 2 VOC	4							✓			Forward to Eurofins
				TOTAL											

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

660605

eurofins | mgt

Melbourne
6 Monterey Road
Dandenong South Vic 3175
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 # 23736

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

Sample Receipt Advice

Company name: **AECOM Aust Pty Ltd Brisbane**

Contact name: James Peachey
Project ID: 60597459
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jun 11, 2019 12:30 PM
Eurofins | mgt reference: **660605**

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 : 6.5 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.

☒ Split sample sent to requested external lab.

☒ 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:

Ryan Gilbert on Phone : or by e.mail: RyanGilbert@eurofins.com

Results will be delivered electronically via e.mail to James Peachey - james.peachey@urs.com.

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 20794

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.

AECOM Aust Pty Ltd Brisbane
Level 8, 540 Wickham Street
Fortitude Valley
QLD 4006

Attention: **James Peachey**

Report **660605-W**
Project name
Project ID 60597459
Received Date Jun 11, 2019

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**QC205_190605** **Water** **B19-Jn14382** **Jun 05, 2019**
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	106
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)^{N04}	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)^{N01}	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
Total Recoverable Hydrocarbons			
TRH C6-C9	0.02	mg/L	< 0.02
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
Heavy Metals			
Arsenic	0.001	mg/L	0.001
Cadmium	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	< 0.001
Copper	0.001	mg/L	< 0.001
Lead	0.001	mg/L	< 0.001
Mercury	0.0001	mg/L	< 0.0001
Nickel	0.001	mg/L	< 0.001
Zinc	0.005	mg/L	0.006

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B6			
BTEX	Brisbane	Jun 13, 2019	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jun 13, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jun 17, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Brisbane	Jun 13, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jun 17, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8	Brisbane	Jun 13, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

Company Name: AECOM Aust Pty Ltd Brisbane
Address: Level 8, 540 Wickham Street
Fortitude Valley
QLD 4006

Project Name:
Project ID: 60597459

Order No.:
Report #: 660605
Phone: 07 3553 2000
Fax: 07 3553 2050

Received: Jun 11, 2019 12:30 PM
Due: Jun 18, 2019
Priority: 5 Day
Contact Name: James Peachey

Eurofins | mgt Analytical Services Manager : Ryan Gilbert

Sample Detail						Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271						X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	QC205_190605	Jun 05, 2019		Water	B19-Jn14382	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 follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food 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 except for PFAS compounds.
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 SRA.

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.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram
ppm: Parts per million
org/100mL: Organisms per 100 millilitres
mg/L: milligrams per litre
ppb: Parts per billion
NTU: Nephelometric Turbidity Units
ug/L: micrograms per litre
%: Percentage
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 and 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.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

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							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	96			70-130	Pass	
Toluene	%	102			70-130	Pass	
Ethylbenzene	%	109			70-130	Pass	
m&p-Xylenes	%	118			70-130	Pass	
Xylenes - Total	%	119			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH C6-C10	%	113			70-130	Pass	
TRH >C10-C16	%	75			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	108			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	78			70-130	Pass	
LCS - % Recovery							
Heavy Metals							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic			%	91			80-120	Pass	
Cadmium			%	92			80-120	Pass	
Chromium			%	92			80-120	Pass	
Copper			%	92			80-120	Pass	
Lead			%	91			80-120	Pass	
Mercury			%	99			70-130	Pass	
Nickel			%	92			80-120	Pass	
Zinc			%	89			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
BTEX				Result 1					
Benzene	B19-Jn12154	NCP	%	94			70-130	Pass	
Toluene	B19-Jn12154	NCP	%	98			70-130	Pass	
Ethylbenzene	B19-Jn12154	NCP	%	96			70-130	Pass	
m&p-Xylenes	B19-Jn12154	NCP	%	97			70-130	Pass	
o-Xylene	B19-Jn12154	NCP	%	91			70-130	Pass	
Xylenes - Total	B19-Jn12154	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	B19-Jn12154	NCP	%	96			70-130	Pass	
TRH >C10-C16	M19-Jn08644	NCP	%	80			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	B19-Jn12154	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M19-Jn08644	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	B19-Jn12146	NCP	%	88			75-125	Pass	
Cadmium	B19-Jn12146	NCP	%	89			75-125	Pass	
Chromium	B19-Jn12146	NCP	%	90			75-125	Pass	
Copper	B19-Jn12146	NCP	%	90			75-125	Pass	
Lead	B19-Jn12146	NCP	%	93			75-125	Pass	
Mercury	B19-Jn12146	NCP	%	97			70-130	Pass	
Nickel	B19-Jn12146	NCP	%	89			75-125	Pass	
Zinc	B19-Jn12146	NCP	%	88			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	B19-Jn13707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	B19-Jn13707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	B19-Jn13707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	B19-Jn13707	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	B19-Jn13707	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	B19-Jn13707	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	B19-Jn13707	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	B19-Jn13707	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M19-Jn12907	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M19-Jn12907	NCP	mg/L	< 0.1		<1	30%	Pass	
TRH >C34-C40	M19-Jn12907	NCP	mg/L	< 0.1		<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	B19-Jn13707	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M19-Jn12907	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M19-Jn12907	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M19-Jn12907	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	B19-Jn12145	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	B19-Jn12145	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	B19-Jn12145	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	B19-Jn12145	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	B19-Jn12145	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury	B19-Jn12145	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	B19-Jn12145	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	B19-Jn12145	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Ryan Gilbert	Analytical Services Manager
Harry Bacalis	Senior Analyst-Volatile (VIC)
Jonathon Angell	Senior Analyst-Volatile (QLD)
Joseph Edouard	Senior Analyst-Organic (VIC)
Steven Trout	Senior Analyst-Metal (QLD)

Glenn Jackson

General 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.

Company Name: AECOM Aust Pty Ltd Brisbane
Address: Level 8, 540 Wickham Street
Fortitude Valley
QLD 4006

Project Name:
Project ID: 60597459

Order No.:
Report #: 660605
Phone: 07 3553 2000
Fax: 07 3553 2050

Received: Jun 11, 2019 12:30 PM
Due: Jun 18, 2019
Priority: 5 Day
Contact Name: James Peachey

Eurofins | mgt Analytical Services Manager : Ryan Gilbert

Sample Detail						Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271						X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	QC205_190605	Jun 05, 2019		Water	B19-Jn14382	X
Test Counts						1

NMI

1/2

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 3 1 Burma Road Pooraka SA 5095
Ph 08 8162 5130 E adelaide@alsglobal.com

☐BRISBANE 2 Byth Street Stafford QLD 4053
Ph 07 3243 7222 E samples.brisbane@alsglobal.com

☐GLADSTONE 48 Callemondah Drive Gladstone QLD 4680
Ph 07 4978 7944 E ALSEnviro.Gladstone@alsglobal.com

☐MACKAY Unit 2 20 Caterpillar Drive Paget QLD 4740
Ph 07 4952 5795 E ALSEnviro.Mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph 03 8549 9600 E samples.melbourne@alsglobal.com

☐MUDGEE 1 29 Sydney Road Mudgee NSW 2850
Ph 02 6372 6735 E mudgee.mail@alsglobal.com

☐NEWCASTLE 5/585 Maitland Road
Ph 02 4014 2500 E samples.newcastle

☐NOWRA 4 13 Geary Place North Nowra
Ph 02 4423 2063 E nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 60
Ph 08 9209 7655 E samples.perth@

Environmental Division
Brisbane
Work Order Reference
EB1908167

Telephone : + 61-7-3243 7222

CLIENT: AECOM

OFFICE: BRISBANE

PROJECT: 60597459 PROJECT NO.:

ORDER NUMBER: PURCHASE ORDER NO.:

PROJECT MANAGER: JAMES PEACHEY CONTACT PH: (07) 3553 2000

SAMPLER: SEBASTIAN KNIGHT SAMPLER MOBILE: 0403 282 171

COC Emailed to ALS? (YES / [✓ NO])

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): PM and ona.kanas@aecom.com

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

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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

☐ Standard TAT (List due date):

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

ALS QUOTE NO.:

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: 1 [✓ 2] 3 4 5 6 7

FOR L

Custod | Yes | No | N/A

Free ic | Yes | No | N/A

Randor | °C

Other c

RELINQUISHED BY: S. Knight

DATE/TIME: 29/3/19 09:30

RECEIVED BY: Howard

DATE/TIME: 9:30 29/3/19

RELINQUI

DATE/TIME:

EIVED BY: 1730 29/3/19

DATE/TIME:

AECOQ6/~~1904~~ 190402

Dec 18/4/2019

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).						Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Super trace PFAS Suite	TRH / BTEXN	Metals (Standard LOR)	E. coli	Total and Faecal Coliforms	Standard PFAS Suite	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SW13_F	27/3/19-14:30	W		7	X	X	X	X	X		
2	SS13	27/3/19-14:15	S		1		X	X			X	
3	PW13	27/3/19-16:15	S		12	X	X	X	X	X		6x bottles / 6x bags.
4	SW12_F	27/3/19-15:30	W		7	X	X	X	X	X		
5	SS12	27/3/19-15:30	S		1		X	X			X	
6	PW12	27/3/19-15:30	S		12	X	X	X	X	X		
7	SW11_F	27/3/19-16:30	W		7	X	X	X	X	X		
8	SS11	27/3/19-16:30	S		1		X	X			X	
9	PW11	27/3/19-16:30	S		12	X	X	X	X	X		
10	SW10_F	28/3/19-16:00	W		7	X	X	X	X	X		
11	SS10	28/3/19-08:45	S		1		X	X			X	
12	PW10	28/3/19-08:45	S		12	X	X	X	X	X		
13	QC100	28/3/19-08:45	S		1		X	X			X	
14	QC101	28/3/19-08:45	S		12	X	X	X	X	X		
15	QC200	28/3/19-08:45	S	N19/008839	1		X	X			X	QC200- Triplicate sample for inter-lab duplicate
				TOTAL								

LAB000085976

RECEIVED
2 APR 2019
BY: 3:10

NMI

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

NMI

2/2

CHAIN OF CUSTODY

ALS Laboratory *please tick* → ALS Sydney for PFOS/PFOA

CLIENT: Aecom
OFFICE: Brisbane
PROJECT Task #: (tick) 60597459
ORDER NUMBER:
PROJECT MANAGER: JAMES PEACHEY **CONTACT PH:** 3553 2000
SAMPLER: Sebastian Knight **SAMPLER MOBILE:** 0403 282 171
COC emailed to ALS? (YES / NO) **EDD FORMAT (or default):**
Email Reports to: PM and ona.kanas@aecom.com
Email Invoice to (will default to PM if no other addresses are listed): PM

TURNAROUND REQUIREMENTS : ☒
(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Non Standard or urgent TAT **(List due date):**
ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: 1 [✓ 2] 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Knight NA	Howard		Dale R
DATE/TIME: 09:30 NA 29/3/19	DATE/TIME: 9:30 29/3/19	DATE/TIME:	DATE/TIME: 1730 29/3/19

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: **ADDITIONAL ANALYSIS REQUEST**

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Super trace PFAS suite	TRH / BTEXN	Metals (Standard LOR)	E. Coli	Total and faecal coliforms			Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
~~16~~ 15	SW10_E	29/3/19 - 7:30	W		7									
~~17~~ 16	SW11_E	29/3/19 - 7:10	W		7	X	X	X	X	X				
~~18~~ 17	SW12_E	29/3/19 - 6:50	W		7	X	X	X	X	X				NMI
~~19~~ 18	SW13_E	29/3/19 - 6:30	W		7	X	X	X	X	X				
~~20~~ 19	QC102	29/3/19 - 7:30	W		7	X	X	X	X	X				
~~21~~	QC201	29/3/19 - 7:30	W	N19/008840	7	X	X	X	X	X				QC201 - Triplicate for inter lab duplicate
				TOTAL	42									

* Micro bottle not provided by client
RV

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

OUT 13287

Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

Attention: JAMES PEACHEY

Customer: AECOM AUSTRALIA PTY LTD

Address: LEVEL 8
FORTITUDE VALLEY QLD 4006

Email: james.peachey@aecom.com

Telephone:

Fax:

LABORATORY DETAILS

Lab: National Measurement Institute

Contact: Susanne Neuman

Address: 105 Delhi Road, North Ryde, NSW
NSW 2113

Email: Susanne.Neuman@measurement.gov.au

Telephone: 02 9449 0181

Fax:

SAMPLE DETAILS

NMI Job Name: **AECO06/190402**

Total No. of Samples: **2**

LRNs	Customer Sample ID	Lab Sample Description
N19/008839	QC200	SOIL 28/3/19 08:45
N19/008840	QC201	WATER 29/3/19 07:30

SAMPLE RECEIVED CONDITION

Date samples received:	2-APR-2019
Sample received in good order:	Yes
NMI Quotation no. provided:	
Client purchase order number:	60597459
Temperature of samples:	Chilled
Comments:	ALL OK
Estimated report date:	18-APR-2019
Mode of Delivery:	Courier

Additional Terms and Conditions

Incomplete / unclear information about samples or required testing will delay the start of the analysis work

If you require your Purchase Order (PO) number to be included on our invoice, please provide the number during sample submission and before the completion of work to avoid unnecessary delays and/or additional processing/handling fees.

The lodgement of an order or receipt of samples for NMI services referenced in this Sample Receipt Notification constitutes an acceptence of the current version of NMI Terms and Conditions or other applicable Terms referenced in the NMI Quotation. NMI Terms and Conditions are available on the web at http://www.measurement.gov.au/Services/EnvironmentalTesting/Pages/Terms-and-Conditions.aspx

REPORT OF ANALYSIS

Client : AECOM AUSTRALIA PTY LTD
LEVEL 8
540 WICKHAM STREET

Attention : JAMES PEACHEY
Project Name : 60597459
Your Client Services Manager : Richard Coghlan

Job No. : AECO06/190402
Quote No. : QT-02129
Order No. : 60597459
Date Received : 02-APR-2019
Sampled By : CLIENT
Phone : 02 9449 0161

Lab Reg No.	Sample Ref	Sample Description
N19/008839	QC200	SOIL 28/3/19 08:45

Lab Reg No.		**N19/008839**				
Date Sampled		**28-MAR-2019**				
	Units					**Method**
BTEX						
Benzene	mg/kg	<0.5				NGCMS_1121
Toluene	mg/kg	<0.5				NGCMS_1121
Ethyl Benzene	mg/kg	<0.5				NGCMS_1121
m, p - Xylene	mg/kg	<1				NGCMS_1121
o - Xylene	mg/kg	<0.5				NGCMS_1121
Surrogate: TOL-D8	%REC	102				NGCMS_1121
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	mg/kg	<0.005				NR70
PFPeA (2706-90-3)	mg/kg	<0.002				NR70
PFHxA (307-24-4)	mg/kg	<0.001				NR70
PFHpA (375-85-9)	mg/kg	<0.001				NR70
PFOA (335-67-1)	mg/kg	<0.001				NR70
PFNA (375-95-1)	mg/kg	<0.001				NR70
PFDA (335-76-2)	mg/kg	<0.001				NR70
PFUdA (2058-94-8)	mg/kg	<0.002				NR70
PFDoA (307-55-1)	mg/kg	<0.002				NR70
PFTrDA (72629-94-8)	mg/kg	<0.002				NR70
PFTeDA (376-06-7)	mg/kg	<0.002				NR70
PFHxDA (67905-19-5)	mg/kg	<0.002				NR70
PFODA (16517-11-6)	mg/kg	<0.005				NR70
FOUEA (70887-84-2)	mg/kg	<0.001				NR70
PFBS (375-73-5)	mg/kg	<0.001				NR70
PFPeS (2706-91-4)	mg/kg	<0.001				NR70
PFHxS (355-46-4)	mg/kg	<0.001				NR70
PFHpS (375-92-8)	mg/kg	<0.001				NR70
PFOS (1763-23-1)	mg/kg	<0.002				NR70
PFNS (68259-12-1)	mg/kg	<0.001				NR70
PFDS (335-77-3)	mg/kg	<0.001				NR70
PFOSA (754-91-6)	mg/kg	<0.001				NR70

REPORT OF ANALYSIS

Lab Reg No.		**N19/008839**				
Date Sampled		**28-MAR-2019**				
	Units					**Method**
PFAS (per-and poly-fluoroalkyl substances)						
N-MeFOSA (31506-32-8)	mg/kg	<0.002				NR70
N-EtFOSA (4151-50-2)	mg/kg	<0.002				NR70
N-MeFOSAA (2355-31-9)	mg/kg	<0.002				NR70
N-EtFOSAA(2991-50-6)	mg/kg	<0.002				NR70
N-MeFOSE (24448-09-7)	mg/kg	<0.005				NR70
N-EtFOSE (1691-99-2)	mg/kg	<0.005				NR70
4:2 FTS (757124-72-4)	mg/kg	<0.001				NR70
6:2 FTS (27619-97-2)	mg/kg	<0.001				NR70
8:2 FTS (39108-34-4)	mg/kg	<0.001				NR70
10:2 FTS (120226-60-0)	mg/kg	<0.002				NR70
8:2 diPAP (678-41-1)	mg/kg	<0.002				NR70
PFBA (Surrogate Recovery)	%	93				NR70
PFPeA (Surrogate Recovery)	%	110				NR70
PFHxA (Surrogate Recovery)	%	92				NR70
PFHpA (Surrogate Recovery)	%	100				NR70
PFOA (Surrogate Recovery)	%	99				NR70
PFNA (Surrogate Recovery)	%	100				NR70
PFDA (Surrogate Recovery)	%	95				NR70
PFUdA (Surrogate Recovery)	%	106				NR70
PFDoA (Surrogate Recovery)	%	98				NR70
PFTeDA (Surrogate Recovery)	%	97				NR70
PFHxDA (Surrogate Recovery)	%	109				NR70
FOUEA (Surrogate Recovery)	%	42				NR70
PFBS (Surrogate Recovery)	%	86				NR70
PFHxS (Surrogate Recovery)	%	93				NR70
PFOS (Surrogate Recovery)	%	93				NR70
PFOSA (Surrogate Recovery)	%	98				NR70
N-MeFOSA (Surrogate Recovery)	%	94				NR70
N-EtFOSA (Surrogate Recovery)	%	90				NR70
N-MeFOSAA (Surrogate Recovery)	%	77				NR70
N-EtFOSAA (Surrogate Recovery)	%	74				NR70
N-MeFOSE (Surrogate Recovery)	%	50				NR70
N-EtFOSE (Surrogate Recovery)	%	38				NR70
4:2 FTS (Surrogate Recovery)	%	58				NR70
6:2 FTS (Surrogate Recovery)	%	68				NR70
8:2 FTS (Surrogate Recovery)	%	75				NR70
8:2 diPAP (Surrogate Recovery)	%	78				NR70
Total Recoverable Hydrocarbons (formerly TPH)						
TRH C6 - C9	mg/kg	<25				NGCMS_1121
TRH C10 - C14	mg/kg	<50				NGCMS_1112

REPORT OF ANALYSIS

Lab Reg No.		**N19/008839**				
Date Sampled		**28-MAR-2019**				
	Units					**Method**
Total Recoverable Hydrocarbons (formerly TPH)						
TRH C15 - C28	mg/kg	<100				NGCMS_1112
TRH C29 - C36	mg/kg	<100				NGCMS_1112
NEPM Total Recoverable Hydrocarbons						
TRH C6 - C10	mg/kg	<25				NGCMS_1121
TRH C6 - C10 less BTEX(F1)	mg/kg	<25				NGCMS_1121
TRH>C10 - C16	mg/kg	<50				NGCMS_1112
TRH>C10 - C16 less Naph(F2)	mg/kg	<50				NGCMS_1112
TRH>C16 - C34(F3)	mg/kg	<100				NGCMS_1112
TRH>C34 - C40(F4)	mg/kg	<100				NGCMS_1112
Surrogate: TOL-D8	%REC	102				NGCMS_1121
Dates						
Date extracted		16-APR-2019				
Date analysed		16-APR-2019				

N19/008839
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting. All results
corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

26-APR-2019

Lab Reg No.		**N19/008839**				
Date Sampled		**28-MAR-2019**				
	Units					**Method**
Total Recoverable Trace Elements by ICP						
Arsenic	mg/kg	15				NT2_49
Cadmium	mg/kg	<0.5				NT2_49
Chromium	mg/kg	36				NT2_49
Copper	mg/kg	17				NT2_49
Lead	mg/kg	19				NT2_49
Mercury	mg/kg	<0.2				NT2_49

REPORT OF ANALYSIS

Lab Reg No.		**N19/008839**				
Date Sampled		**28-MAR-2019**				
	Units					**Method**
Total Recoverable Trace Elements by ICP						
Nickel	mg/kg	19				NT2_49
Zinc	mg/kg	58				NT2_49
Trace Elements						
Total Solids	%	35.9				NT2_49

Pankaj Barai, Analyst
Inorganics - NSW
Accreditation No. 198

26-APR-2019

All results are expressed on a dry weight basis.

REPORT OF ANALYSIS

Report No. RN1230043

Client	: AECOM AUSTRALIA PTY LTD LEVEL 8 540 WICKHAM STREET	**Job No.**	: AECO06/190402
		Quote No.	: QT-02129
		Order No.	: 60597459
		Date Received	: 02-APR-2019
Attention	: JAMES PEACHEY	**Sampled By**	: CLIENT
Project Name	: 60597459		
Your Client Services Manager	: Richard Coghlan	**Phone**	: 02 9449 0161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/008840	QC201	WATER 29/3/19 07:30

Lab Reg No.			**N19/008840**				
Date Sampled			**29-MAR-2019**				
		Units					**Method**
BTEX							
Benzene		ug/L	<1				NGCMS_1121
Toluene		ug/L	<1				NGCMS_1121
Ethyl Benzene		ug/L	<1				NGCMS_1121
m, p - Xylene		ug/L	<2				NGCMS_1121
o - Xylene		ug/L	<1				NGCMS_1121
Surrogate: TOL-D8		%REC	99				NGCMS_1121
PFAS (per-and poly-fluoroalkyl substances)							
PFBA (375-22-4)		ug/L	<0.005				NR70
PFPeA (2706-90-3)		ug/L	<0.002				NR70
PFHxA (307-24-4)		ug/L	<0.001				NR70
PFHpA (375-85-9)		ug/L	<0.001				NR70
PFOA (335-67-1)		ug/L	<0.001				NR70
PFNA (375-95-1)		ug/L	<0.001				NR70
PFDA (335-76-2)		ug/L	<0.001				NR70
PFUdA (2058-94-8)		ug/L	<0.001				NR70
PFDoA (307-55-1)		ug/L	<0.001				NR70
PFTrDA (72629-94-8)		ug/L	<0.002				NR70
PFTeDA (376-06-7)		ug/L	<0.002				NR70
PFHxDA (67905-19-5)		ug/L	<0.002				NR70
PFODA (16517-11-6)		ug/L	<0.005				NR70
FOUEA (70887-84-2)		ug/L	<0.001				NR70
PFBS (375-73-5)		ug/L	<0.001				NR70
PFPeS (2706-91-4)		ug/L	<0.001				NR70
PFHxS (355-46-4)		ug/L	<0.001				NR70
PFHpS (375-92-8)		ug/L	<0.001				NR70
PFOS (1763-23-1)		ug/L	<0.002				NR70
PFNS (68259-12-1)		ug/L	<0.001				NR70
PFDS (335-77-3)		ug/L	<0.001				NR70
PFOSA (754-91-6)		ug/L	<0.001				NR70

REPORT OF ANALYSIS

Lab Reg No.		**N19/008840**				
Date Sampled		**29-MAR-2019**				
	Units					**Method**
PFAS (per-and poly-fluoroalkyl substances)						
N-MeFOSA (31506-32-8)	ug/L	<0.002				NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002				NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002				NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002				NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005				NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005				NR70
4:2 FTS (757124-72-4)	ug/L	<0.001				NR70
6:2 FTS (27619-97-2)	ug/L	<0.001				NR70
8:2 FTS (39108-34-4)	ug/L	<0.001				NR70
10:2 FTS (120226-60-0)	ug/L	<0.001				NR70
8:2 diPAP (678-41-1)	ug/L	<0.002				NR70
PFBA (Surrogate Recovery)	%	117				NR70
PFPeA (Surrogate Recovery)	%	153				NR70
PFHxA (Surrogate Recovery)	%	109				NR70
PFHpA (Surrogate Recovery)	%	116				NR70
PFOA (Surrogate Recovery)	%	114				NR70
PFNA (Surrogate Recovery)	%	112				NR70
PFDA (Surrogate Recovery)	%	97				NR70
PFUdA (Surrogate Recovery)	%	86				NR70
PFDoA (Surrogate Recovery)	%	72				NR70
PFTeDA (Surrogate Recovery)	%	54				NR70
PFHxDA (Surrogate Recovery)	%	61				NR70
FOUEA (Surrogate Recovery)	%	86				NR70
PFBS (Surrogate Recovery)	%	111				NR70
PFHxS (Surrogate Recovery)	%	116				NR70
PFOS (Surrogate Recovery)	%	107				NR70
PFOSA (Surrogate Recovery)	%	89				NR70
N-MeFOSA (Surrogate Recovery)	%	50				NR70
N-EtFOSA (Surrogate Recovery)	%	41				NR70
N-MeFOSAA (Surrogate Recovery)	%	46				NR70
N-EtFOSAA (Surrogate Recovery)	%	42				NR70
N-MeFOSE (Surrogate Recovery)	%	39				NR70
N-EtFOSE (Surrogate Recovery)	%	70				NR70
4:2 FTS (Surrogate Recovery)	%	106				NR70
6:2 FTS (Surrogate Recovery)	%	100				NR70
8:2 FTS (Surrogate Recovery)	%	82				NR70
8:2 diPAP (Surrogate Recovery)	%	22				NR70
Total Recoverable Hydrocarbons (formerly TPH)						
TRH C6 - C9	ug/L	<25				NGCMS_1121
TRH C10 - C14	ug/L	<25				NGCMS_1112

REPORT OF ANALYSIS

Lab Reg No.			**N19/008840**				
Date Sampled			**29-MAR-2019**				
		Units					**Method**
Total Recoverable Hydrocarbons (formerly TPH)							
TRH C15 - C28		ug/L	<100				NGCMS_1112
TRH C29 - C36		ug/L	<100				NGCMS_1112
NEPM Total Recoverable Hydrocarbons							
TRH C6 - C10		ug/L	<25				NGCMS_1121
TRH C6 - C10 less BTEX(F1)		ug/L	<25				NGCMS_1121
TRH>C10 - C16		ug/L	<25				NGCMS_1112
TRH>C10 - C16 less Naph(F2)		ug/L	<25				NGCMS_1112
TRH>C16 - C34(F3)		ug/L	<100				NGCMS_1112
TRH>C34 - C40(F4)		ug/L	<100				NGCMS_1112
Surrogate: TOL-D8		%REC	99				NGCMS_1121
Dates							
Date extracted			11-APR-2019				
Date analysed			15-APR-2019				

N19/008840
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting. All results
corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

26-APR-2019

Lab Reg No.			**N19/008840**				
Date Sampled			**29-MAR-2019**				
		Units					**Method**
Total Recoverable Trace Elements by ICP							
Arsenic Total		ug/L	1.2				NT2_47
Cadmium Total		ug/L	<0.1				NT2_47
Chromium Total		ug/L	1.4				NT2_47
Copper Total		ug/L	1.0				NT2_47
Lead Total		ug/L	<1				NT2_47
Mercury Total		ug/L	<0.1				NT2_47

REPORT OF ANALYSIS

Report No. RN1230043

Lab Reg No.			**N19/008840**				
Date Sampled			**29-MAR-2019**				
		Units					**Method**
Total Recoverable Trace Elements by ICP							
Nickel Total		ug/L	1.0				NT2_47
Zinc Total		ug/L	3.3				NT2_47

Richard Tea, Analyst
Inorganics - NSW
Accreditation No. 198

26-APR-2019

Total = acid extractable elements

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

ACCREDITED FOR
TECHNICAL
COMPETENCE

This Report supersedes reports: *RN1229575* *RN1230002*

Measurement Uncertainty is available upon request.

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO006/190402 **Sample Matrix:** solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
PFBA (375-22-4)	NR70	0.002	<0.002	NA	NA	NA	147	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	143	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	125	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	129	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	130	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	144	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	124	NA
PFUdA (2058-94-8)	NR70	0.002	<0.002	NA	NA	NA	143	NA
PFDoA (307-55-1)	NR70	0.002	<0.002	NA	NA	NA	137	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	113	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	136	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	129	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	126	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	141	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	127	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	138	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	114	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	132	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	138	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	138	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	129	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	146	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	110	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	128	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	134	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	108	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	126	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	156	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	134	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	144	NA
10:2 FTS (120226-60-0)	NR70	0.002	<0.002	NA	NA	NA	146	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	117	NA

Results expressed in percentage (%) or mg/kg wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **18/04/2019**

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/190402 **Sample Matrix:** Solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
Organics Section								
BTEX								
Benzene	NGCMS_1121	0.5	<0.5	NA	NA	NA	92	NA
Toluene	NGCMS_1121	0.5	<0.5	NA	NA	NA	85	NA
Ethyl Benzene	NGCMS_1121	0.5	<0.5	NA	NA	NA	88	NA
m, p - Xylene	NGCMS_1121	1	<1	NA	NA	NA	92	NA
o-Xylene	NGCMS_1121	0.5	<0.5	NA	NA	NA	83	NA
TRH								
TRH C6-C10	NGCMS_1121	25	<25	NA	NA	NA	88	NA
TRH >C10-C16	NGCMS_1112	50	<50	NA	NA	NA	101	NA
TRH >C16-C34	NGCMS_1112	100	<100	NA	NA	NA	102	NA
TRH >C34-C40	NGCMS_1112	100	<100	NA	NA	NA	-	NA
Surrogate: TOL-D8	NGCMS_1121	-	-	NA	NA	NA	100	NA

Results expressed in percentage (%) or mg/kg wherever appropriate.
Acceptable Spike recovery is 70-130% (BTEX and TRH C6-C10); 50-150% (TRH >C10-C40)
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **18/04/2019**

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM

NMI QA Report No: AECO06/190402 T1 **Sample Matrix:** Soil

Analyte	Method	LOR	Blank	Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	
Inorganics Section				N19/008839				N19/008839
Arsenic	NT2.49	0.5	<0.5	15	14	7	97	100
Cadmium	NT2.49	0.5	<0.5	<0.5	<0.5	NA	91	98
Chromium	NT2.49	0.5	<0.5	36	35	3	94	98
Copper	NT2.49	0.5	<0.5	17	17	0	93	98
Lead	NT2.49	0.5	<0.5	19	19	0	85	99
Mercury	NT2.49	0.2	<0.2	<0.2	<0.2	NA	83	98
Nickel	NT2.49	0.5	<0.5	20	19	5	104	100
Zinc	NT2.49	0.5	<0.5	59	58	2	101	98

Filename = K:\Inorganics\Quality System\QA Reports\TE\QAR2019\Soil\

Legend:
Acceptable recovery is 75-120%.
Acceptable RPDs on duplicates is 44% at concentrations >5 times LOR. Greater RPD may be expected at <5 times LOR.
LOR = Limit Of Reporting ND = Not Determined
RPD = Relative Percent Difference NA = Not Applicable
LCS = Laboratory Control Sample.
#: Spike level is less than 50% of the sample's concentration, hence the recovery data is not reliable.
**: reference value not available
Comments:
Results greater than ten times LOR have been rounded to two significant figures.
This report shall not be reproduced except in full.

Signed:

Dr Andrew Evans
Inorganics, NMI-North Ryde
Date: **18/04/2019**

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/190402 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
Organics Section								
BTEX								
Benzene	NGCMS_1121	1	<1	NA	NA	NA	96	NA
Toluene	NGCMS_1121	1	<1	NA	NA	NA	94	NA
Ethyl Benzene	NGCMS_1121	1	<1	NA	NA	NA	98	NA
m, p - Xylene	NGCMS_1121	2	<2	NA	NA	NA	97	NA
o-Xylene	NGCMS_1121	1	<1	NA	NA	NA	98	NA
TRH								
TRH C6-C10	NGCMS_1121	25	<25	NA	NA	NA	97	NA
TRH >C10-C16	NGCMS_1112	25	<25	NA	NA	NA	86	NA
TRH >C16-C34	NGCMS_1112	100	<100	NA	NA	NA	84	NA
TRH >C34-C40	NGCMS_1112	100	<100	NA	NA	NA	-	NA
Surrogate: TOL-D8	NGCMS_1121	-	-	NA	NA	NA	103	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 70-130% (BTEX and TRH C6-C10); 50-150% (TRH >C10-C40)
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **16/04/2019**

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO006/190402 **Sample Matrix:** liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	103	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	93	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	95	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	99	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	93	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	82	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	87	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	88	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	92	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	90	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	91	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	94	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	99	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	96	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	98	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	91	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	91	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	104	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	90	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	81	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	83	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	86	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	122	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	72	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	111	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	116	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	100	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	86	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	94	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **16/04/2019**

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: **AECOM AUSTRALIA PTY LTD**

NMI QA Report No: **AECO06/190402 T1** **Sample Matrix:** Water (Total)

Analyte	Method	LOR	Blank	Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
Inorganics Section								
Arsenic Total	NT2.47	1	<1	NA	NA	NA	97	NA
Cadmium Total	NT2.47	0.1	<0.1	NA	NA	NA	106	NA
Chromium Total	NT2.47	1	<1	NA	NA	NA	95	NA
Copper Total	NT2.47	1	<1	NA	NA	NA	102	NA
Lead Total	NT2.47	1	<1	NA	NA	NA	104	NA
Mercury Total	NT2.47	0.1	<0.1	NA	NA	NA	106	NA
Nickel Total	NT2.47	1	<1	NA	NA	NA	100	NA
Zinc Total	NT2.47	1	<1	NA	NA	NA	105	NA

Filename =
K:\Inorganics\Reporting\Water\Water 2019\CSV\

Legend:
Acceptable recovery is 75-120%.
Acceptable RPDs on duplicates is 44% at concentrations >5 times LOR. Greater RPD may be expected at <5 times LOR.
LOR = Limit Of Reporting ND = Not Determined
RPD = Relative Percent Difference NA = Not Applicable
LCS = Laboratory Control Sample.
#: Spike level is less than 50% of the sample's concentration, hence the recovery data is not reliable.

Comments:
Results greater than ten times LOR have been rounded to two significant figures.
This report shall not be reproduced except in full.

Signed:

Dr Andrew Evans
Inorganics , NMI-North Ryde

Date: **24/04/2019**

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO6/190612 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	106	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	161	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	136	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	110	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	112	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	110	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	94	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	81	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	89	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	94	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	110	NA
PFODA (16517-11-6)	NR70	0.005	<0.005	NA	NA	NA	111	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	108	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	94	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	52	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	97	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	96	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	94	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	97	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	111	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	97	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	97	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	114	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	100	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	122	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	115	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	112	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	93	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	90	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	98	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **24/06/2019**

AECO⌀6/190612 Due 19/06/19

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095
Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 9600 E: samples.melbourne@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680
Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com

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

☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 024423 2063 E: nowra@alsglobal.com

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

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

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

CLIENT: AECOM

OFFICE: Brisbane

PROJECT: 60597459

ORDER NUMBER:

PROJECT MANAGER: James Peachey **CONTACT PH:**

SAMPLER: Camden McCosker **SAMPLER MOBILE:** 0499 990 214

COC emailed to ALS? (YES / NO) **EDD FORMAT (or default):**

Email Reports to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com; camden.mccosker@aecom.com

Email Invoice to (will default to PM if no other addresses are listed): Ona.Kanas@aecom.com; james.peachey@aecom.com

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

☑ Standard TAT (List due date):

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

ALS QUOTE NO.: EN-004-16

COC SEQUENCE NUMBER (Circle)

COC: [✓ 1] 2 3 4 5 6 7

OF: [✓ 1] 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Camden			
DATE/TIME:	DATE/TIME:	DATE/TIME: 11/6 LAB000086760 TNT	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please Forward to NMI with this COC

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)		TOTAL CONTAINERS	EP231x-LL ~~EP231-ST~~ (PFAS 28 super trace) Low-level	NT-1D (Cations - Ca/Mg/Na/K/hardness)	NT-2A Anions	HCO3	PO4	EP231-X PFAS28	W-5 (TRH/BTEXN/8 Metals)	W-18 (TRH C6-C10/BTEXN)	BTEXN	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	QC202-190605	5/6/19	GW	1P	N19/015082		/									Forward to NMI
	QC203-190605	↓	↓	11	N19/015083		/									Forward to NMI
	QC206-190605	↓	↓	11	N19/015084		/									Forward to NMI
	QC204-190605	5/6/19	S	1P	N19/015085							\				
					TOTAL											

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

RECEIVED
12 JUN 2019
BY: 13:20

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

Attention: JAMES PEACHEY

Customer: AECOM AUSTRALIA PTY LTD

Address: LEVEL 8
FORTITUDE VALLEY QLD 4006

Email: james.peachey@aecom.com

Telephone:

Fax:

LABORATORY DETAILS

Lab: National Measurement Institute

Contact: Susanne Neuman

Address: 105 Delhi Road, North Ryde, NSW
NSW 2113

Email: Susanne.Neuman@measurement.gov.au

Telephone: 02 9449 0181

Fax:

SAMPLE DETAILS

NMI Job Name: **AECO06/190612**

Total No. of Samples: **4**

LRNs	Customer Sample ID	Lab Sample Description
N19/015082	QC202_190605	WATER 05/06/19
N19/015083	QC203_190605	WATER 05/06/19
N19/015084	QC206_190605	WATER 05/06/19
N19/015085	QC204_190605	SOIL 05/06/19

SAMPLE RECEIVED CONDITION

Date samples received:	12-JUN-2019
Sample received in good order:	Yes
NMI Quotation no. provided:	
Client purchase order number:	60597459
Temperature of samples:	Chilled
Comments:	ALL OK
Estimated report date:	19-JUN-2019
Mode of Delivery:	Courier

Additional Terms and Conditions

Incomplete / unclear information about samples or required testing will delay the start of the analysis work

If you require your Purchase Order (PO) number to be included on our invoice, please provide the number during sample submission and before the completion of work to avoid unnecessary delays and/or additional processing/handling fees.

The lodgement of an order or receipt of samples for NMI services referenced in this Sample Receipt Notification constitutes an acceptence of the current version of NMI Terms and Conditions or other applicable Terms referenced in the NMI Quotation. NMI Terms and Conditions are available on the web at http://www.measurement.gov.au/Services/EnvironmentalTesting/Pages/Terms-and-Conditions.aspx

REPORT OF ANALYSIS

Report No. RN1236817

Client	: AECOM AUSTRALIA PTY LTD LEVEL 8 540 WICKHAM STREET	**Job No.**	: AECO06/190612
		Quote No.	: QT-02129
		Order No.	: 60597459
		Date Received	: 12-JUN-2019
Attention	: JAMES PEACHEY	**Sampled By**	: CLIENT
Project Name	: 60597459		
Your Client Services Manager	: Richard Coghlan	**Phone**	: 02 9449 0161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/015085	QC204_190605	SOIL 05/06/19

Lab Reg No.		**N19/015085**				
Date Sampled		**05-JUN-2019**				
	Units					**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	mg/kg	<0.01				NR70
PFPeA (2706-90-3)	mg/kg	0.015				NR70
PFHxA (307-24-4)	mg/kg	0.028				NR70
PFHpA (375-85-9)	mg/kg	0.0095				NR70
PFOA (335-67-1)	mg/kg	0.016				NR70
PFNA (375-95-1)	mg/kg	<0.005				NR70
PFDA (335-76-2)	mg/kg	<0.005				NR70
PFUdA (2058-94-8)	mg/kg	<0.005				NR70
PFDoA (307-55-1)	mg/kg	<0.005				NR70
PFTrDA (72629-94-8)	mg/kg	<0.005				NR70
PFTeDA (376-06-7)	mg/kg	<0.005				NR70
PFHxDA (67905-19-5)	mg/kg	<0.005				NR70
PFODA (16517-11-6)	mg/kg	<0.005				NR70
FOUEA (70887-84-2)	mg/kg	<0.005				NR70
PFBS (375-73-5)	mg/kg	0.012				NR70
PFPeS (2706-91-4)	mg/kg	0.015				NR70
PFHxS (355-46-4)	mg/kg	0.17				NR70
PFHpS (375-92-8)	mg/kg	0.012				NR70
PFOS (1763-23-1)	mg/kg	0.80				NR70
PFNS (68259-12-1)	mg/kg	<0.005				NR70
PFDS (335-77-3)	mg/kg	<0.005				NR70
PFOSA (754-91-6)	mg/kg	<0.005				NR70
N-MeFOSA (31506-32-8)	mg/kg	<0.005				NR70
N-EtFOSA (4151-50-2)	mg/kg	<0.005				NR70
N-MeFOSAA (2355-31-9)	mg/kg	<0.005				NR70
N-EtFOSAA(2991-50-6)	mg/kg	<0.005				NR70
N-MeFOSE (24448-09-7)	mg/kg	<0.005				NR70
N-EtFOSE (1691-99-2)	mg/kg	<0.005				NR70
4:2 FTS (757124-72-4)	mg/kg	<0.005				NR70

REPORT OF ANALYSIS

Lab Reg No.		N19/015085				
Date Sampled		05-JUN-2019				
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
6:2 FTS (27619-97-2)	mg/kg	<0.005				NR70
8:2 FTS (39108-34-4)	mg/kg	<0.005				NR70
10:2 FTS (120226-60-0)	mg/kg	<0.005				NR70
8:2 diPAP (678-41-1)	mg/kg	<0.005				NR70
PFBA (Surrogate Recovery)	%	97				NR70
PFPeA (Surrogate Recovery)	%	116				NR70
PFHxA (Surrogate Recovery)	%	98				NR70
PFHpA (Surrogate Recovery)	%	107				NR70
PFOA (Surrogate Recovery)	%	109				NR70
PFNA (Surrogate Recovery)	%	84				NR70
PFDA (Surrogate Recovery)	%	101				NR70
PFUdA (Surrogate Recovery)	%	128				NR70
PFDoA (Surrogate Recovery)	%	92				NR70
PFTeDA (Surrogate Recovery)	%	102				NR70
PFHxDA (Surrogate Recovery)	%	114				NR70
FOUEA (Surrogate Recovery)	%	98				NR70
PFBS (Surrogate Recovery)	%	102				NR70
PFHxS (Surrogate Recovery)	%	101				NR70
PFOS (Surrogate Recovery)	%	101				NR70
PFOSA (Surrogate Recovery)	%	86				NR70
N-MeFOSA (Surrogate Recovery)	%	93				NR70
N-EtFOSA (Surrogate Recovery)	%	100				NR70
N-MeFOSAA (Surrogate Recovery)	%	89				NR70
N-EtFOSAA (Surrogate Recovery)	%	116				NR70
N-MeFOSE (Surrogate Recovery)	%	76				NR70
N-EtFOSE (Surrogate Recovery)	%	43				NR70
4:2 FTS (Surrogate Recovery)	%	117				NR70
6:2 FTS (Surrogate Recovery)	%	97				NR70
8:2 FTS (Surrogate Recovery)	%	107				NR70
8:2 diPAP (Surrogate Recovery)	%	265				NR70
Dates						
Date extracted		20-JUN-2019				
Date analysed		21-JUN-2019				

N19/015085

PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

REPORT OF ANALYSIS

LOR values for were raised due to the low solid content in the sample.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Luke

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

24-JUN-2019

Lab Reg No.		**N19/015085**				
Date Sampled		**05-JUN-2019**				
	Units					**Method**
Trace Elements						
Total Solids	%	13.1				NT2_49

Richard Tea, Analyst
Inorganics - NSW
Accreditation No. 198

24-JUN-2019

All results are expressed on a dry weight basis.

REPORT OF ANALYSIS

Client	: AECOM AUSTRALIA PTY LTD LEVEL 8 540 WICKHAM STREET	**Job No.**	: AECO06/190612
		Quote No.	: QT-02129
		Order No.	: 60597459
		Date Received	: 12-JUN-2019
Attention	: JAMES PEACHEY	**Sampled By**	: CLIENT
Project Name	: 60597459		
Your Client Services Manager	: Richard Coghlan	**Phone**	: 02 9449 0161

Lab Reg No.	Sample Ref	Sample Description
N19/015082	QC202_190605	WATER 05/06/19
N19/015083	QC203_190605	WATER 05/06/19
N19/015084	QC206_190605	WATER 05/06/19

Lab Reg No.		**N19/015082**	**N19/015083**	**N19/015084**		
Date Sampled		**05-JUN-2019**	**05-JUN-2019**	**05-JUN-2019**		
	Units					**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	0.035	0.0051	0.53		NR70
PFPeA (2706-90-3)	ug/L	0.031	<0.002	1.2		NR70
PFHxA (307-24-4)	ug/L	0.046	0.0033	4.1		NR70
PFHpA (375-85-9)	ug/L	0.012	<0.001	1.1		NR70
PFOA (335-67-1)	ug/L	0.022	<0.001	1.7		NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001	0.18		NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	0.048		NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	0.0018		NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001		NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002		NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002	<0.002		NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002	<0.002		NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005	<0.005		NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001		NR70
PFBS (375-73-5)	ug/L	0.022	0.0041	1.1		NR70
PFPeS (2706-91-4)	ug/L	0.020	0.0029	1.3		NR70
PFHxS (355-46-4)	ug/L	0.27	0.019	15		NR70
PFHpS (375-92-8)	ug/L	0.010	<0.001	0.85		NR70
PFOS (1763-23-1)	ug/L	0.058	0.0052	41		NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	0.039		NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	0.0019		NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	0.0018		NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002	<0.002		NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002	<0.002		NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002		NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002	<0.002		NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005	<0.005		NR70

REPORT OF ANALYSIS

Lab Reg No.			N19/015082	N19/015083	N19/015084		
Date Sampled			05-JUN-2019	05-JUN-2019	05-JUN-2019		
		Units					Method
PFAS (per-and poly-fluoroalkyl substances)							
N-EtFOSE (1691-99-2)		ug/L	<0.005	<0.005	<0.005		NR70
4:2 FTS (757124-72-4)		ug/L	<0.001	<0.001	<0.001		NR70
6:2 FTS (27619-97-2)		ug/L	<0.001	0.0046	0.019		NR70
8:2 FTS (39108-34-4)		ug/L	<0.001	<0.001	0.036		NR70
10:2 FTS (120226-60-0)		ug/L	<0.001	<0.001	<0.001		NR70
8:2 diPAP (678-41-1)		ug/L	<0.002	<0.002	<0.002		NR70
PFBA (Surrogate Recovery)		%	90	91	97		NR70
PFPeA (Surrogate Recovery)		%	204	190	89		NR70
PFHxA (Surrogate Recovery)		%	72	50	92		NR70
PFHpA (Surrogate Recovery)		%	81	73	96		NR70
PFOA (Surrogate Recovery)		%	86	100	93		NR70
PFNA (Surrogate Recovery)		%	79	84	40		NR70
PFDA (Surrogate Recovery)		%	81	84	88		NR70
PFUdA (Surrogate Recovery)		%	79	105	105		NR70
PFDoA (Surrogate Recovery)		%	52	80	78		NR70
PFTeDA (Surrogate Recovery)		%	64	76	74		NR70
PFHxDA (Surrogate Recovery)		%	66	97	132		NR70
FOUEA (Surrogate Recovery)		%	77	109	86		NR70
PFBS (Surrogate Recovery)		%	68	60	90		NR70
PFHxS (Surrogate Recovery)		%	82	92	86		NR70
PFOS (Surrogate Recovery)		%	83	84	87		NR70
PFOSA (Surrogate Recovery)		%	60	70	77		NR70
N-MeFOSA (Surrogate Recovery)		%	38	60	84		NR70
N-EtFOSA (Surrogate Recovery)		%	44	76	93		NR70
N-MeFOSAA (Surrogate Recovery)		%	53	79	60		NR70
N-EtFOSAA (Surrogate Recovery)		%	41	75	73		NR70
N-MeFOSE (Surrogate Recovery)		%	34	61	108		NR70
N-EtFOSE (Surrogate Recovery)		%	36	65	63		NR70
4:2 FTS (Surrogate Recovery)		%	233	265	190		NR70
6:2 FTS (Surrogate Recovery)		%	90	326	102		NR70
8:2 FTS (Surrogate Recovery)		%	62	132	92		NR70
8:2 diPAP (Surrogate Recovery)		%	52	61	98		NR70
Dates							
Date extracted			20-JUN-2019	20-JUN-2019	20-JUN-2019		
Date analysed			21-JUN-2019	21-JUN-2019	21-JUN-2019		

N19/015082
to

REPORT OF ANALYSIS

N19/015084:
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

24-JUN-2019

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: *RN1236789*

Measurement Uncertainty is available upon request.

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO6/190612 **Sample Matrix:** Solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
PFBA (375-22-4)	NR70	0.002	<0.002	NA	NA	NA	95	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	110	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	101	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	95	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	100	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	97	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFUdA (2058-94-8)	NR70	0.002	<0.002	NA	NA	NA	77	NA
PFDoA (307-55-1)	NR70	0.002	<0.002	NA	NA	NA	94	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	89	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	98	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	100	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	100	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	96	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	48	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	99	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	106	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	106	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	101	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	91	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	90	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	97	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	101	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	94	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	112	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	161	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	108	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	126	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	104	NA
10:2 FTS (120226-60-0)	NR70	0.002	<0.002	NA	NA	NA	108	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	113	NA

Results expressed in percentage (%) or mg/kg wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **24/06/2019**

CHAIN OF CUSTODY

ALS Laboratory: *please tick* → ALS Sydney for PFOS/PFOA

CLIENT: Aecom
OFFICE: Brisbane
PROJECT Task #: (tick) 60597459
ORDER NUMBER:
PROJECT MANAGER: JAMES PEACHEY CONTACT PH: 3553 2006
SAMPLER: SEBASTIAN KNIGHT SAMPLER MOBILE: 0403 282 171
COC emailed to ALS? (YES / NO) EDD FORMAT (or default):
Email Reports to: PM and ona.Ranasa@aecom.com
Email Invoice to (will default to PM if no other addresses are listed): PM

TURNAROUND REQUIREMENTS : ☒ (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: [✓ 1] 2 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

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

RELINQUISHED BY: S. KNIGHT
NA
DATE/TIME: 1/4/19 1pm
NA

RECEIVED BY: Dow. B
DATE/TIME: 1-4-19 13-55

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY: Vishal
DATE/TIME: 03/04/19 10:30AM

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ADDITIONAL ANALYSIS REQUEST

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION				Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	STANDARD PFAS SUITE	Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BIO11_A	28/3/19 12:30	S		1			ALL SAMPLES ARE TISSUE SAMPLES (fish and crustacea)
2	BIO11_B	28/3/19 12:30	S		1	X		
3	BIO11_C	28/3/19 12:30	S		1	X		
4	BIO11_D	28/3/19 12:30	S		1	X		
5	BIO10_A	28/3/19 10:30	S		1	X		
6	BIO10_B	27/3/19	S		1	X		
7	BIO10_C	27/3/19	S		1	X		
8	BIO10_D	29/3/19 7:30	S		1	X		
9	BIO13_A	27/3/19 14:00	S		1	X		
10	BIO13_B	27/3/19 14:30	S		1	X		
11	BIO13_C	27/3/19 14:30	S		1	X		
12	BIO13_D	27/3/19 15:00	S		1	X		
13	BIO12_A	28/3/19 15:30	S		1	X		
				TOTAL				

Environmental Division
Sydney
Work Order Reference
ES1910340

Telephone : + 61-2-8784 8555

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

ALS

CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Sydney for PFOS/PFOA

CLIENT: Aecom

OFFICE: Brisbane

PROJECT Task #: (tick) 60597459

ORDER NUMBER:

PROJECT MANAGER: JAMES PEACHEY CONTACT PH: 3553 2006

SAMPLER: SEBASTIAN KNIGHT SAMPLER MOBILE: 0403 282 171

COC emailed to ALS? (YES / NO) EDD FORMAT (or default):

Email Reports to: PM and ana.kanas@aecom.com

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

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

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

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)

COC: 1 [✓ 2] 3 4 5 6 7

OF: 1 [✓ 2] 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

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

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. KNIGHT NA	Dan .B		Vishal
DATE/TIME: 1/4/19 1pm NA	DATE/TIME: 1-4-19 @13-55	DATE/TIME:	DATE/TIME: 03/04/19 10:30Am

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ADDITIONAL ANALYSIS REQUEST

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	STANDARD PFAS SUITE							Hold	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
14	BI012_B	28/3/19 15:30	S		1									
15	BI012_C	28/3/19 15:30	S		1	X								
16	BI012_D	28/3/19 15:30	S		1	X								
					TOTAL 16									

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

SAMPLE RECEIPT INFORMATION & BOTTLE TYPE

53

WORKORDER No:

To be completed by Sample Receipt 01/04/19 13-55

Sorting Times
(Only record for BP, Mobil & URS)
Time Sorting Commenced:
Time Placed in Fridge:
Sorting to Fridge Target Time <1 Hour

Temperature Details (record if NOT on COC)
Sample Temp 2.4° °C
Chilling Method - Circle
[✓ Ice] / Ice Bricks / No Chilling

Packaging
Security Seal Intact?
Circle below
[✓ YES] (Security seal intact)
NO (Security seal broken)
NA (No security seal used)

Packaging Type	**No.**
Hard Esky Sm	1
Foam Esky	
Other	

Courier Details (Mandatory for Quarantine)
Con Note: Toll
Cells shaded grey don't need to be completed on this form if they are entered directly into LIMS/ANGEL by Sample Receipt staff.

Samples checked, labelled and put in trays by:
Initial:

Sample Receipt Advice Comments - To be completed by Sorting Staff

VOC analysis may be compromised as sample containers contained **headspace** *(list)*:

Details of any samples damaged during transit:

Other Information (eg. Were bottles received that weren't completely filled) (eg. If sample temperature is above 6'C add further detail here - *Internal use only - Not for SRN*):

Br RAVE Bottle Map

Metals Bottles: F = Field filtered. T = Total. N/S = Not Specified.
Cyanide Bottles: Tr = Treated, meaning the client has ticked the pre-treated box on the bottle. Un = Untreated, meaning the box is not ticked.
Ferrous Iron, Hexavalent Chromium & Geosmin and MIB: F = Field filtered. N/S = Not Specified.
Soil Bags: S = Small. M = Medium (~500mL asbestos or PSD bag). L = Large (~6kg FMT bag)

		-S								-G		-O		-P						-RF				-RGF			-B						-M		-TOC		-VOC				
																			-RT				-RGT											-DOC						
Lab No.	Soil Jar 125mL 250mL	Bag Plastic S/L White Green	Nat Green			Nat White 500mL	UT Nutrients		Green Vial (Geos & MIB)	Glass Orange		Glass Purp (O&G) 250ML	Plastic Purp 250mL 125mL	Plastic Grey (PFOS / PFOA) 60mL	Bacto Black / Thio Grey 250mL	60mL Nitric Red				60mL Lab Acidified				NaOH Hexa Chrome Blue 60mL		NaOH CN Blue 60mL 250mL	0.5L Glass Brown CIRCLE Lab Preserved Or Pre-preserved	Fluoro Yellow (Sulfide) 250mL		Fluoro Orange 125mL (Sulfite)	HCl Fe^{2+} Maroon 60mL		Vial H_2SO_4 Purple 40mL		Vial H_2SO_4 Purple	H.S Y/N	EDA Vial 40mL	Endo-Toxin Tube	DUST CuSO4 UnPres	Other
																STD		ORC		STD		ORC						UHS												
	Frozen Wet Dry		1L	500mL	250mL	1L	Light Green (T)	Turquoise (F)		100 mL	500 mL	1L	60mL	250mL	500mL	F	T	F	T	F	T	F	T	F	T			F	T		F	T	TOC	DOC	40mL (VOC)				2.5L 4L	
	This line allows for an initial indication of bottle types received without specifying the exact number for each sample. When using this function tick the boxes matching the containers received for this work order.																																							
		1																																						
1																																								
2																																								
3																																								
4																																								
5																																								
6																																								
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8																																								
9																																								
10																																								

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1910340**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES PEACHEY	Contact	: Brenda Hong
Address	: Brisbane	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: james.peachey@aecom.com	E-mail	: Brenda.Hong@ALSGlobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 2 8784 8555
Facsimile	: +61 07 3553 2050	Facsimile	: +61-2-8784 8500
Project	: 60597459 1.0	Page	: 1 of 3
Order number	: 60597459 1.0	Quote number	: EB2017AECOMAU0014 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SEBASTIAN KNIGHT		

Dates

Date Samples Received	: 03-Apr-2019 10:30	Issue Date	: 04-Apr-2019
Client Requested Due Date	: 24-Apr-2019	Scheduled Reporting Date	: **24-Apr-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 6.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA recommends samples be chilled to <6°C for chemical analysis, and <10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: **BIOTA**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	BIOTA - EP231X PFAS - Full Suite (28 analytes) - includes PFOS
ES1910340-001	28-Mar-2019 12:30	BIO11_A	✓
ES1910340-002	28-Mar-2019 12:30	BIO11_B	✓
ES1910340-003	28-Mar-2019 12:30	BIO11_C	✓
ES1910340-004	28-Mar-2019 12:30	BIO11_D	✓
ES1910340-005	28-Mar-2019 10:30	BIO10_A	✓
ES1910340-006	27-Mar-2019 00:00	BIO10_B	✓
ES1910340-007	27-Mar-2019 00:00	BIO10_C	✓
ES1910340-008	29-Mar-2019 07:30	BIO10_D	✓
ES1910340-009	27-Mar-2019 14:00	BIO13_A	✓
ES1910340-010	27-Mar-2019 14:30	BIO13_B	✓
ES1910340-011	28-Mar-2019 14:30	BIO13_C	✓
ES1910340-012	28-Mar-2019 15:00	BIO13_D	✓
ES1910340-013	28-Mar-2019 15:30	BIO12_A	✓
ES1910340-014	28-Mar-2019 15:30	BIO12_B	✓
ES1910340-015	28-Mar-2019 15:30	BIO12_C	✓
ES1910340-016	28-Mar-2019 15:30	BIO12_D	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

JAMES PEACHEY

- *AU Certificate of Analysis - NATA (COA)	Email	james.peachey@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	james.peachey@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	james.peachey@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	james.peachey@aecom.com
- A4 - AU Tax Invoice (INV)	Email	james.peachey@aecom.com
- Chain of Custody (CoC) (COC)	Email	james.peachey@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	james.peachey@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	james.peachey@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	james.peachey@aecom.com
- EDI Format - XTab (XTAB)	Email	james.peachey@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	james.peachey@aecom.com

ONA KANAS

- *AU Certificate of Analysis - NATA (COA)	Email	ona.kanas@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ona.kanas@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ona.kanas@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ona.kanas@aecom.com
- Chain of Custody (CoC) (COC)	Email	ona.kanas@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	ona.kanas@aecom.com
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)	Email	ona.kanas@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	ona.kanas@aecom.com
- EDI Format - XTab (XTAB)	Email	ona.kanas@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	ona.kanas@aecom.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES1910340**
Client : **AECOM Australia Pty Ltd**
Contact : MR JAMES PEACHEY
Address :
Brisbane
Telephone : +61 07 3553 2000
Project : 60597459 1.0
Order number : 60597459 1.0
C-O-C number : ----
Sampler : SEBASTIAN KNIGHT
Site : ----
Quote number : EN/004/16
No. of samples received : 16
No. of samples analysed : 16

Page : 1 of 11
Laboratory : Environmental Division Sydney
Contact : Brenda Hong
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61 2 8784 8555
Date Samples Received : 03-Apr-2019 10:30
Date Analysis Commenced : 04-Apr-2019
Issue Date : 18-Apr-2019 12:02

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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- EP231X: Poor matrix spike precision due to sample matrix interference, confirmed by re-extraction and re-analysis.
- EP231X; Matrix Spike (MS) recoveries for anaytes Perfluorobutanoic acid (PFBA) and Perfluoropentanoic acid (PFPeA) bias low due to matrix intrerferences. Confirmed by re-extraction and re-analysis.
- EP231X (Biota): ALS NATA accreditation for PFAS in Biota covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids in fish (whole and muscle), plants and vegetable matrices, with the exception PFBA (fish only), EtFOSA, MeFOSE, EtFOSE, MeFOSAA, EtFOSAA.

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)			*Client sample ID*	**BIO11_A**	**BIO11_B**	**BIO11_C**	**BIO11_D**	**BIO10_A**
			Client sampling date / time	28-Mar-2019 12:30	28-Mar-2019 12:30	28-Mar-2019 12:30	28-Mar-2019 12:30	28-Mar-2019 10:30
Compound	*CAS Number*	*LOR*	*Unit*	**ES1910340-001**	**ES1910340-002**	**ES1910340-003**	**ES1910340-004**	**ES1910340-005**
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	**Fish**	**Fish**	**Fish**	**Fish**	**Fish**
ø Weight of Sample Prepared	----	0.1	g	**122**	**49.1**	**58.3**	**39.5**	**55.6**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	**1**	**2**	<1	**4**
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	**1**	**2**	<1	**4**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

			Client sample ID	BIO11_A	BIO11_B	BIO11_C	BIO11_D	BIO10_A
			Client sampling date / time	28-Mar-2019 12:30	28-Mar-2019 12:30	28-Mar-2019 12:30	28-Mar-2019 12:30	28-Mar-2019 10:30
Compound	CAS Number	LOR	Unit	ES1910340-001	ES1910340-002	ES1910340-003	ES1910340-004	ES1910340-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231P: PFAS Sums								
^ **Sum of PFAS**	----	1	µg/kg	<1	**1**	**2**	<1	**4**
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	**68.0**	**62.5**	**70.5**	**74.5**	**65.5**
13C8-PFOA	----	1	%	**77.0**	**70.5**	**77.5**	**84.5**	**71.5**

Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)			Client sample ID	BIO10_B	BIO10_C	BIO10_D	BIO13_A	BIO13_B
			Client sampling date / time	27-Mar-2019 00:00	27-Mar-2019 00:00	29-Mar-2019 07:30	27-Mar-2019 14:00	27-Mar-2019 14:30
Compound	CAS Number	LOR	Unit	ES1910340-006	ES1910340-007	ES1910340-008	ES1910340-009	ES1910340-010
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Fish	Fish	Fish	Fish	Fish
ø Weight of Sample Prepared	----	0.1	g	18.6	37.2	14.0	45.5	49.3
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	1	3	3	1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	1	<1	1	1	1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	1	1	4	4	2
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)			Client sample ID	**BIO10_B**	**BIO10_C**	**BIO10_D**	**BIO13_A**	**BIO13_B**
			Client sampling date / time	27-Mar-2019 00:00	27-Mar-2019 00:00	29-Mar-2019 07:30	27-Mar-2019 14:00	27-Mar-2019 14:30
Compound	CAS Number	LOR	Unit	**ES1910340-006**	**ES1910340-007**	**ES1910340-008**	**ES1910340-009**	**ES1910340-010**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231P: PFAS Sums								
^ **Sum of PFAS**	----	1	µg/kg	**1**	**1**	**4**	**4**	**2**
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	**71.0**	**65.5**	**67.5**	**75.5**	**56.0**
13C8-PFOA	----	1	%	**79.5**	**79.0**	**73.0**	**84.0**	**60.5**

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)			*Client sample ID*	**BIO13_C**	**BIO13_D**	**BIO12_A**	**BIO12_B**	**BIO12_C**
			Client sampling date / time	28-Mar-2019 14:30	28-Mar-2019 15:00	28-Mar-2019 15:30	28-Mar-2019 15:30	28-Mar-2019 15:30
Compound	*CAS Number*	*LOR*	*Unit*	**ES1910340-011**	**ES1910340-012**	**ES1910340-013**	**ES1910340-014**	**ES1910340-015**
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø **Sample Description**	----	-	--	**Fish**	**Fish**	**Fish**	**Fish**	**Fish**
ø **Weight of Sample Prepared**	----	0.1	g	**43.8**	**66.5**	**71.2**	**43.9**	**35.7**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	**2**	**2**	**2**	**2**	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	**2**	**2**	**2**	**2**	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)			Client sample ID	**BIO13_C**	**BIO13_D**	**BIO12_A**	**BIO12_B**	**BIO12_C**
			Client sampling date / time	28-Mar-2019 14:30	28-Mar-2019 15:00	28-Mar-2019 15:30	28-Mar-2019 15:30	28-Mar-2019 15:30
Compound	CAS Number	LOR	Unit	**ES1910340-011**	**ES1910340-012**	**ES1910340-013**	**ES1910340-014**	**ES1910340-015**
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	<2	<2	<2
EP231P: PFAS Sums								
^ **Sum of PFAS**	----	1	µg/kg	**2**	**2**	**2**	**2**	<1
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	**70.5**	**55.0**	**70.5**	**77.0**	**79.0**
13C8-PFOA	----	1	%	**81.0**	**59.0**	**82.5**	**84.5**	**96.5**

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)			Client sample ID	**BIO12_D**	----	----	----	----
			Client sampling date / time	28-Mar-2019 15:30	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1910340-016**	--------	--------	--------	--------
				Result	----	----	----	----
Biota Sample Pre-Preparation								
ø **Sample Description**	----	-	--	**Fish**	----	----	----	----
ø **Weight of Sample Prepared**	----	0.1	g	**38.0**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	----	----	----	----
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	----	----	----	----
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg	<2	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg	<2	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	----	----	----	----

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)			Client sample ID	**BIO12_D**	----	----	----	----
			Client sampling date / time	28-Mar-2019 15:30	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1910340-016**	--------	--------	--------	--------
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg	<5	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg	<5	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	----	----	----	----
EP231P: PFAS Sums								
^ **Sum of PFAS**	----	1	µg/kg	<1	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	1	%	**63.5**	----	----	----	----
13C8-PFOA	----	1	%	**72.0**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **BIOTA**

Compound	*CAS Number*	Recovery Limits (%) Low	Recovery Limits (%) High
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

QUALITY CONTROL REPORT

Work Order	: **ES1910340**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES PEACHEY	Contact	: Brenda Hong
Address	: Brisbane	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 3553 2000	Telephone	: +61 2 8784 8555
Project	: 60597459 1.0	Date Samples Received	: 03-Apr-2019
Order number	: 60597459 1.0	Date Analysis Commenced	: 04-Apr-2019
C-O-C number	: ----	Issue Date	: 18-Apr-2019
Sampler	: SEBASTIAN KNIGHT		
Site	: ----		
Quote number	: EN/004/16		
No. of samples received	: 16		
No. of samples analysed	: 16		

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*
Franco Lentini		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: **BIOTA**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2277221)									
ES1910340-001	BIO11_A	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<2	<2	0.00	No Limit
ES1910340-011	BIO13_C	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	2	2	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<2	<2	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2277221)									
ES1910340-001	BIO11_A	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
ES1910340-011	BIO13_C	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<2	<2	0.00	No Limit

Sub-Matrix: **BIOTA**

				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: 2277221) - continued									
ES1910340-011	BIO13_C	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2277221)									
ES1910340-001	BIO11_A	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
ES1910340-011	BIO13_C	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	<1	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<5	<5	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	<2	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2277221)									
ES1910340-001	BIO11_A	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit

Sub-Matrix: **BIOTA**

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: 2277221) - continued									
ES1910340-001	BIO11_A	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
ES1910340-011	BIO13_C	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	<2	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	<2	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2277221)									
ES1910340-001	BIO11_A	EP231X: Sum of PFAS	----	1	µg/kg	<1	<1	0.00	No Limit
ES1910340-011	BIO13_C	EP231X: Sum of PFAS	----	1	µg/kg	2	2	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: **BIOTA**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2277221)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	5 µg/kg	61.6	50	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	5 µg/kg	66.8	50	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	5 µg/kg	63.2	50	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	5 µg/kg	55.6	50	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	5 µg/kg	52.4	50	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	1	µg/kg	<1	5 µg/kg	62.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2277221)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	25 µg/kg	59.2	50	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	1	µg/kg	<1	5 µg/kg	67.2	50	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	5 µg/kg	71.2	50	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg	<1	5 µg/kg	67.6	50	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg	<1	5 µg/kg	64.0	50	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg	<1	5 µg/kg	67.6	50	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg	<1	5 µg/kg	66.4	50	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg	<1	5 µg/kg	86.0	50	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	1	µg/kg	<1	5 µg/kg	78.0	50	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	µg/kg	<1	5 µg/kg	70.0	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg	<2	12.5 µg/kg	65.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2277221)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	1	µg/kg	<1	5 µg/kg	72.0	50	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	2	µg/kg	<2	12.5 µg/kg	68.2	50	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg	<2	12.5 µg/kg	65.9	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg	<2	12.5 µg/kg	71.2	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg	<2	12.5 µg/kg	68.6	50	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg	<1	5 µg/kg	68.8	50	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg	<1	5 µg/kg	66.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2277221)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg	<2	5 µg/kg	67.6	50	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg	<2	5 µg/kg	74.0	50	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg	<2	5 µg/kg	76.4	50	130

Sub-Matrix: **BIOTA**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2277221) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg	<2	5 µg/kg	89.2	50	130
EP231P: PFAS Sums (QCLot: 2277221)								
EP231X: Sum of PFAS	----	1	µg/kg	<1	----	----	----	----

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: **BIOTA**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2277221)							
ES1910340-002	BIO11_B	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	5 µg/kg	59.2	30	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	5 µg/kg	53.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	5 µg/kg	73.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	5 µg/kg	61.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	5 µg/kg	70.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	5 µg/kg	56.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2277221)							
ES1910340-002	BIO11_B	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	25 µg/kg	# 44.9	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	5 µg/kg	# 31.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	5 µg/kg	61.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	5 µg/kg	67.2	30	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	5 µg/kg	63.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	5 µg/kg	66.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	5 µg/kg	63.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	5 µg/kg	83.6	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	5 µg/kg	100	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	5 µg/kg	93.2	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	12.5 µg/kg	58.2	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2277221)							
ES1910340-002	BIO11_B	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	5 µg/kg	78.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	12.5 µg/kg	66.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	12.5 µg/kg	62.9	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	12.5 µg/kg	57.9	30	130

Sub-Matrix: **BIOTA**

				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: 2277221) - continued							
ES1910340-002	BIO11_B	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	12.5 µg/kg	69.9	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	5 µg/kg	64.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	5 µg/kg	65.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2277221)							
ES1910340-002	BIO11_B	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	5 µg/kg	62.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	5 µg/kg	73.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	5 µg/kg	73.2	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	5 µg/kg	107	50	130

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1910340**	Page	: 1 of 6
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES PEACHEY	Telephone	: +61 2 8784 8555
Project	: 60597459 1.0	Date Samples Received	: 03-Apr-2019
Site	: ----	Issue Date	: 18-Apr-2019
Sampler	: SEBASTIAN KNIGHT	No. of samples received	: 16
Order number	: 60597459 1.0	No. of samples analysed	: 16

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **BIOTA**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
EP231B: Perfluoroalkyl Carboxylic Acids	ES1910340--002	BIO11_B	**Perfluorobutanoic acid (PFBA)**	375-22-4	44.9 %	50-130%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	ES1910340--002	BIO11_B	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	31.2 %	50-130%	**Recovery less than lower data quality objective**

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: **BIOTA**

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

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
Biota Sample Pre-Preparation							
Frozen Sample (Biota-PP) BIO10_B, BIO10_C, BIO13_A, BIO13_B	**27-Mar-2019**	**04-Apr-2019**	----	----	**----**	----	----
Frozen Sample (Biota-PP) BIO11_A, BIO11_B, BIO11_C, BIO11_D, BIO10_A, BIO13_C, BIO13_D, BIO12_A, BIO12_B, BIO12_C, BIO12_D	**28-Mar-2019**	**04-Apr-2019**	----	----	**----**	----	----
Frozen Sample (Biota-PP) BIO10_D	**29-Mar-2019**	**04-Apr-2019**	----	----	**----**	----	----

Matrix: **BIOTA**

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

Method *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation* *Date extracted*	 *Due for extraction*	 *Evaluation*	*Analysis* *Date analysed*	 *Due for analysis*	 *Evaluation*
EP231A: Perfluoroalkyl Sulfonic Acids							
Frozen Sample (EP231-PFOS-SP) BIO10_B, BIO10_C, BIO13_A, BIO13_B	**27-Mar-2019**	**09-Apr-2019**	23-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231-PFOS-SP) BIO11_A, BIO11_B, BIO11_C, BIO11_D, BIO10_A, BIO13_C, BIO13_D, BIO12_A, BIO12_B, BIO12_C, BIO12_D	**28-Mar-2019**	**09-Apr-2019**	24-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231-PFOS-SP) BIO10_D	**29-Mar-2019**	**09-Apr-2019**	25-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
Frozen Sample (EP231X) BIO10_B, BIO10_C, BIO13_A, BIO13_B	**27-Mar-2019**	**09-Apr-2019**	23-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO11_A, BIO11_B, BIO11_C, BIO11_D, BIO10_A, BIO13_C, BIO13_D, BIO12_A, BIO12_B, BIO12_C, BIO12_D	**28-Mar-2019**	**09-Apr-2019**	24-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO10_D	**29-Mar-2019**	**09-Apr-2019**	25-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
Frozen Sample (EP231X) BIO10_B, BIO10_C, BIO13_A, BIO13_B	**27-Mar-2019**	**09-Apr-2019**	23-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO11_A, BIO11_B, BIO11_C, BIO11_D, BIO10_A, BIO13_C, BIO13_D, BIO12_A, BIO12_B, BIO12_C, BIO12_D	**28-Mar-2019**	**09-Apr-2019**	24-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO10_D	**29-Mar-2019**	**09-Apr-2019**	25-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓

Matrix: **BIOTA**

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							
Frozen Sample (EP231X) BIO10_B, BIO10_C, BIO13_A, BIO13_B	**27-Mar-2019**	**09-Apr-2019**	23-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO11_A, BIO11_B, BIO11_C, BIO11_D, BIO10_A, BIO13_C, BIO13_D, BIO12_A, BIO12_B, BIO12_C, BIO12_D	**28-Mar-2019**	**09-Apr-2019**	24-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO10_D	**29-Mar-2019**	**09-Apr-2019**	25-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
EP231P: PFAS Sums							
Frozen Sample (EP231X) BIO10_B, BIO10_C, BIO13_A, BIO13_B	**27-Mar-2019**	**09-Apr-2019**	23-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO11_A, BIO11_B, BIO11_C, BIO11_D, BIO10_A, BIO13_C, BIO13_D, BIO12_A, BIO12_B, BIO12_C, BIO12_D	**28-Mar-2019**	**09-Apr-2019**	24-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓
Frozen Sample (EP231X) BIO10_D	**29-Mar-2019**	**09-Apr-2019**	25-Sep-2019	✓	**09-Apr-2019**	19-May-2019	✓

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: **BIOTA**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
PFOS - Linear/Branched Speciation	EP231-PFOS-SP	BIOTA	n-house: Linear PFOS is determined by quantiation of the separate linear peak using linear PFOS. Branched PFOS is determined as the difference between total PFOS (determined using a mixed linear/branched standard) and linear PFOS.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	BIOTA	In-House. A sample extract is analysed by LC/MSMS, ESI Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Prep-Preparation for Biota Analysis	* Biota-PP	BIOTA	A sample is prepared from whole or particular tissues/organs, identified, homogenised and the total weight of prepared sample recorded.
Sample Preparation for PFAS in Biota	EP231-PR	BIOTA	In-house. A sample is mixed with water and a complexing reagent and twice extracted with MTBE. Sample cleanup is employed as required.