Airservices Australia

Sunshine Coast Airport
Preliminary Sampling

October 2017

Table of contents

Table index

Appendices

List of abbreviations

General terms	
AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARFF	Aviation Rescue and Fire Fighting
bgl	Below ground level
CSM	Conceptual Site Model
DBYD	Dial Before You Dig
DO	Dissolved Oxygen
DQI	Data Quality Indicator
EC	Electrical Conductivity
EISL	Ecological Interim Screening Level
HISL	Human Health Interim Screening Level
HBSC	Health-based Screening Criteria
HSE	Health, Safety and Environment
ISL	Interim Screening Level
JSEA	Job Safety and Environmental Assessment
LOR	Limit of Reporting
NATA	National Association of Testing Authorities
NDD	Non Destructive Drilling
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
PFASs	Per- and poly- fluorinated alkyl substances
PFOS	Perfluorooctane sulfonate
PFOA	Perfluorooctanoic acid
PSD	Particle Size Distribution
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling Analysis and Quality Plan
SWL	Standing Water Level
TDS	Total Dissolved Solids
ToC	Top of Casing
TOC	Total Organic Carbon
WHS	Work Health and Safety

Units	
ha	Hectare
L	Litre
km	Kilometre
m	Metre
m^2	square metres
mg/L	milligrams per litre
mbgl	metres below ground level
mg/kg	milligrams per kilogram
mbToC	metres below top of casing
mV	milli-Volt
µg/L	micrograms per litre
µS/cm	micro-Siemens per centimetre

1. Introduction

Airservices Australia (Airservices) engaged GHD Pty Ltd (GHD) to complete a preliminary site investigation (PSI) (GHD, 2016a) for the Sunshine Coast Airport (SCA) (herein referred as 'the site').

A Sample Analysis and Quality Plan (SAQP) was subsequently prepared by GHD (GHD, 2016b) for a targeted Preliminary Sampling program which focused on the assessment of potential contamination from the historical use of Aqueous Film Forming Foams (AFFF).

This report documents the methodology and findings of the Preliminary Sampling and provides supporting information to the PSI. The Site locality and investigation area are shown in Figure 1 of Appendix A.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4. The report should also be read with reference to the PSI which contains further interpretation of the data, including a conceptual site model (CSM).

1.1 Objective of the preliminary sampling

The objective of the Preliminary Sampling was to validate and further investigate the desktop findings of the PSI through a preliminary and targeted soil, groundwater and surface water sampling program.

1.2 Scope of works

Based on the outcomes of the PSI, a Sampling Analysis and Quality Plan (SAQP) was developed for the investigation (GHD, 2016b).

The SAQP was prepared so that the field investigations and analyses were undertaken in a way that enabled the collection and reporting of reliable data on which to base any further soil, groundwater and surface water monitoring programs for specific areas of the site.

The GHD SAQP described drilling methods, sampling equipment, well development strategy, sample collection protocols, sample processing, field and laboratory sample analysis, equipment decontamination and quality-assurance and quality-control (QA / QC) procedures.

The scope of the Preliminary Sampling was as follows:

- Development of a Site Work Program including a Health Safety & Environment (HSE) Plan, and review of underground services plans and site plans
- Liaison and coordination of fieldwork with subcontractors, Airservices and SCA Pty Ltd
- Clearance of all sample locations by a Services Locator
- Drilling of soil bores GW01 to GW06 to a maximum depth of 4.0 metres below ground level (mbgl) and conversion of the bores to groundwater monitoring wells
- Collection of soil samples from soil boreholes at depths of 0.2, 0.5 and 1.0 mbgl and then every metre thereafter, with additional samples collected at any changes in the lithology, to a maximum depth of 4.5 mbgl
- Collection of six targeted surface soil samples (SS1 to SS6)
- Collection of four surface water samples (SW01 to SW04)
- Laboratory analysis of collected samples at Australian Laboratory Services (ALS) Environmental (primary lab) and Eurofins MGT (secondary lab)

- Gauging of six newly installed monitoring wells using an oil/water interface probe to measure the depth to groundwater
- Groundwater sampling of six newly installed monitoring wells using low flow sampling techniques
- Collection of QA / QC samples for soil, surface water and groundwater including “Blind” and “Split” duplicate samples
- Laboratory analysis of soil, surface water and groundwater samples by ALS Environmental (primary laboratory) and Eurofins MGT (secondary laboratory)
- Collection of QA / QC samples for soil, surface water and groundwater including Duplicate and Split samples
- Placement of all soil cuttings and purged groundwater in drums for storage and off-site disposal to a licensed facility
- Preparation of this Preliminary Sampling Report

1.3 Methodology references

This Preliminary Sampling report was undertaken with reference to the following:

- *Airports Act*, 1996
- *Airports (Environment Protection) Regulations* 1997
- Australian Standard AS 4482.1,2005. *Guide to the investigation and sampling of sites with potentially contaminated soil - Part 1: Non-volatile and semi-volatile compounds*
- Australian/New Zealand Standard (AS/NZ) 5667.1,1998. *Water Quality – Sampling. Standards Australia*
- *Environmental Protection Act* 1994 (EP Act)
- GHD, 2015. *Airservices Australia, Managing PFC Contamination at Airports, Interim Contamination Management Strategy and Decision Framework* (GHD Reference 31\32279\239419)
- GHD, 2016b. *Airservices Australia, Sunshine Coast Airport Sampling Analysis and Quality Plan* (GHD reference 31\34071\252996)
- GHD, 2017: PFAS Investigations – Derivation of soil and water criteria
- National Environment Protection Council (NEPC), *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended by the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 No. 1* (the ASC NEPM).
- Government of Western Australia, Department of Environmental Regulation (DER), 2016: Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS).

1.4 Limitations

This report has been prepared by GHD for Airservices Australia and may only be used and relied on by Airservices Australia for the purpose agreed between GHD and Airservices Australia as set out in Section 1 of this report. Reliance of other parties on this report is subject to agreement in writing by GHD.

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

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

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

GHD has prepared this report, partly on the basis of information provided by Airservices Australia, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

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

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

GHD has considered and/or tested for only those chemicals specifically referred to in this Report and makes no statement or representation as to the existence (or otherwise) of any other chemicals.

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

These Limitations should be read in conjunction with the entire Report and no excerpts are taken to be representative of the findings of this Report.

2. Field investigations

2.1 Fieldwork methodology

2.1.1 Fieldwork program

The fieldwork program completed by GHD for the site is summarised in Table 1. It included the following:

- Drilling and installation of six groundwater monitoring wells to maximum 4.5 mbgl
- Collection of six surface soil samples at targeted locations
- Collection of four surface water samples from open drains on site
- Gauging and sampling of the six new groundwater monitoring wells

The sampling locations are shown in Figure 2 of Appendix A.

Table 1 Summary of fieldwork program

Date	Activity
15 November 2016	Underground services location Collection of surface soil samples SS1, SS2 and SS6 Collection of surface water samples SW01 – SW04
16 – 17 November 2016	Drilling, sampling and conversion into groundwater monitoring wells for GW01 to GW06 Development of newly installed groundwater monitoring wells.
29 November 2016	Gauging and sampling of all groundwater monitoring wells (Refer to Section 2.3). Surveying of the six newly installed monitoring wells.

2.1.2 Soil investigation

The soil sampling methodology is summarised in Table 2.

Table 2 Soil sampling methodology

Activity	Details
Underground services locating	A Telstra-accredited independent contractor cleared underground services using radio-detection and ground penetrating radar with reference to utility plans provided by Dial Before You Dig (DBYD), prior to any sub-surface works being undertaken[1]
Sampling plan design	The objectives and rationale of the sampling locations were detailed in the SAQP (GHDb, 2016).
Soil borehole drilling	For the six soil borehole sampling locations (GW01 to GW06) non-destructive drilling (NDD) was undertaken to a depth of 1.5 mbgl to assist with clearance of underground services. Boreholes were then advanced with hollow-stem auger to a depth of 3.1 to 4.5 mbgl for the purpose of installing the six groundwater monitoring wells. Decontamination of the hollow flight auger was undertaken between each sampling location in accordance with the decontamination methodology outlined in the SAQP.

[1] Site plans have been sought from SCA, however, was not available at the time of service locating.

Activity	Details
Soil bore sampling	Soil samples were collected from each of the soil boreholes generally at the surface, 0.2 mbgl, 0.5 mbgl and 1 mbgl, and then at approximately 1 m intervals to a maximum depth of 5 m or where changes in lithology or potential contamination were observed, unless soil samples were too saturated to be recovered from the drilling. Soil samples were placed into laboratory-supplied glass and plastic jars. A total of 38 soil samples were collected. Two QA/QC samples were collected (QA-04 and QA-05). The records of the soils encountered, and the samples collected (including depths and related observations) are presented in the borehole records (Appendix B) and Laboratory reports (Appendix H). Samples were identified with a unique label, incorporating the sample location and depth (i.e. GW01-0.2 was collected from borehole GW01 at a depth of 0.2 mbgl). Care was taken during the sampling to obtain representative samples from each target level.
Surface soil samples	Six surface samples (SS1-SS6) were collected from the site. One QA sample (QA01) was collected. Description of samples collected are provided in Appendix E. The surface soil samples were collected by mattock and placed into laboratory-supplied jars/containers. Sampling implements were decontaminated between sampling locations in accordance with the decontamination methodology outlined in the SAQP.
Soil logging	Soils encountered during drilling were described and logged by an environmental scientist. Borehole logs are presented in Appendix B.
QA/QC	Three quality control samples (QA-01, QA-04 and QA-05) were collected including two intra-laboratory (“blind”) samples and one inter-laboratory (“split”) sample. Refer to Appendix G for more details.
Sample preservation and transport	Samples were chilled upon collection, stored on ice in an insulated cooler box while on site and in transit to the laboratory. Samples were transferred to the laboratory under Chain of Custody (COC) documentation. COC documentation is presented in Appendix H.
Soil cuttings	NDD waste and soil cuttings from drilling activities were contained in 205 L sealed drums and placed at the current fire station for disposal off site to a licensed facility. Disposal documentation is included in Appendix J.

2.2 Groundwater monitoring and sampling methodology

2.2.1 Groundwater well installation

Soil bores were converted to groundwater monitoring wells as detailed in Table 3. Locations are shown in Figure 2 in Appendix A. Well construction details are provided in the bore logs contained in Appendix C.

Groundwater well GW04 was re-located to the southern end of the main runway during installation as the initial proposed location in the SAQP (GHD, 2016[b]) is within the new runway construction footprint (as advised by SCA).

Table 3 Groundwater well installation

Activity	Details
Well construction	The monitoring wells were installed in accordance with the *Minimum Construction Requirements for Water Bores in Australia, Edition 3* (2012) and were constructed using 50 mm ID uPVC, Class 18, acid washed threaded standpipe with machine slotted (0.4 mm) screened section. Graded and washed filter sand was installed in and slightly above (0.2 m) the screened interval, then a bentonite seal (0.5 m thick) and grout to the surface. Screened and installation depths varied according to strata, identified conductive horizons, areas of potential contamination and the need to minimise the risk of cross contamination between soil horizons/ units. Most wells were completed with a standpipe monument except for GW06, which was completed at the surface with a flush mounted gatic cover concreted below the ground surface. Details of the monitoring wells construction were provided in the borehole logs in Appendix B.
Well survey	The top of the well casings were surveyed to Australian Height Datum (AHD). In the instance where the top of casing was not evenly cut, the highest point of the top of casing was surveyed. The survey data (with reference level at top of casing) is presented in Appendix C.
Well development	The newly installed wells were developed following construction by the air-lifting method using an air compressor. The air compressor had an air filter so no hydrocarbons were introduced into the wells. GHD considers that the development procedure undertaken was adequate to prepare the wells for collection of representative groundwater samples.
Development water disposal	Purged water from the well development was placed into 205 L sealed drums or container and placed at the current fire station for disposal off site to a licensed facility. Disposal documentation is included in Appendix J.

2.3 Groundwater monitoring and sampling methodology

A total of six newly installed monitoring wells (GW01-GW06) were gauged, purged and sampled.

Details of the groundwater monitoring and sampling methodologies are summarised in Table 4.

Table 4 Groundwater monitoring and sampling methodology

Activity	Details
Well gauging	Prior to the sampling of wells, groundwater standing water levels (SWL) were gauged using an interface probe measuring from the top of the bore casing (TOC). Standing water levels were recorded on field record sheets. The gauged groundwater levels for each well at the site are summarised in Appendix D. The calibration certificate of the interface probe is provided in Appendix I.
Groundwater sampling	All monitoring wells were purged and sampled through low-flow sampling methods using a Geopump® peristaltic pump. Groundwater field parameters were monitored during the purging process using a multi-probe water quality meter, reporting temperature, DO, pH, ORP and EC. The calibration certificate of the water quality meter is provided in Appendix I. Groundwater samples were collected directly from the tubing into laboratory-supplied containers (pre-preserved where appropriate) and filled up to minimise headspace. A total of 8 groundwater samples were collected [including two quality assurance (QA)/quality control (QC) samples (QA01, QA02)]. All samples were stored on ice in an esky until delivered to the laboratory. Groundwater gauging and sampling records are provided in Appendix D.

Activity	Details
Decontamination	Decontamination of the interface probe was undertaken through a three stage approach. The first stage involved cleaning the equipment using a mixture of pH neutral phosphate free detergent (Decon® Neutracon) in water, followed by a deionised water wash and a final rinse stage Single-use tubing was used for sample collection to minimise potential for cross contamination.
QA/QC	Two quality control samples were collected including one intra-laboratory ("blind") samples and one inter-laboratory ("split") samples. Refer to Appendix G.
Purge water disposal	Purged water from the well development/sampling was placed into 205 L sealed drums or container and placed at the current fire station for disposal off site to a licensed facility. Disposal documentation is included in Appendix J.

2.4 Surface water sampling methodology

The surface water sampling methodology is summarised in Table 5.

Table 5 Surface water sampling methodology

Activity	Details
Sampling plan design	The objectives and rationale of the sampling locations were detailed in the SAQP (GHD, 2016b).
Surface water sampling	Surface water samples were collected from four locations (refer to Figure 2 in Appendix A for the sample locations). A total of six surface water samples [including two quality assurance (QA)/quality control (QC) samples (QA-02, QA-03)] were submitted to the laboratory for analysis. Samples were collected directly from the surface water bodies using laboratory-supplied bottles.
Surface water logging	Field observations and physicochemical parameters (pH, electrical conductivity (EC), dissolved oxygen (DO) and oxidation-reduction potential (ORP)) of the surface water were recorded by an environmental scientist and results presented in Appendix E.
QA/QC	One intra-laboratory ("blind") quality control sample was collected. Refer to Appendix G.
Sample preservation and transport	Samples were chilled upon collection by storing on ice in an insulated cooler box while on site and in transit to the laboratory. Samples were transferred to the laboratory under Chain of Custody (COC) documentation. COC documentation is presented in Appendix H.

2.5 Work health and safety

GHD prepared a project-specific Job Safety and Environmental Analysis (JSEA) for the site works in accordance with Work Health and Safety (WHS) legislation and associated Codes of Practice. The JSEA consisted of a summary of relevant site activities and specific job-related tasks; a hazard register that identifies all foreseeable hazards; risk ranking and risk management measures for each identified hazard; and procedures for monitoring and / or implementing remedial actions to manage all project-based risks. Prior to undertaking the fieldworks, the GHD field representatives and all subcontractors held a pre-start meeting on site. Daily GHD WHS forms were completed before commencement of work each day.

2.6 Laboratory analysis program

2.6.1 Analytical laboratories

GHD consigned all primary soil, water and groundwater samples and intra-laboratory field duplicate (blind) samples to ALS for analysis. The analysis of inter-laboratory duplicate (split) samples, for QC purposes, was completed by Eurofins MGT.

Both the primary and secondary laboratories are National Association of Testing Authorities (NATA) registered for the analytical program undertaken.

Certified laboratory documentation including chain of custody records, sample receipt notifications, certificates of analysis and laboratory QA / QC reports are provided in Appendix H.

2.6.2 Sample analysis

The number of soil, groundwater and surface water samples collected at the site and the scheduled analyses are documented in Table 6. The list of PFASs analysed in the extended suite and their respective abbreviations is provided in Table 7.

Table 6 Laboratory analytical schedule

Sample type	No. primary samples		No. QC samples	Analytical suite
	Collected	Analysed		
Soil				
Soil borehole	38	14	2	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite Total organic carbon (TOC) Metals [2] Cation exchange capacity (CEC) Particle size distribution (PSD) pH Electrical Conductivity (EC) Potassium
Soil surface	6	6	1	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite Metals[3] Cation exchange capacity (CEC) pH Total organic carbon (TOC) Potassium
Water				
Groundwater	6	6	2	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite pH Total Dissolved Solids (TDS) Major cations and anions
Surface water	4	4	1	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite pH Total Dissolved Solids (TDS)

[2] Metal analysis included aluminium, arsenic, cadmium, chromium (III+VI), copper, iron, lead, mercury, nickel, silicon and zinc.

Table 7 PFASs analysed within the PFAS suite

Perfluoroalkyl Sulfonic Acids	Abbreviation
Perfluorobutane sulfonic acid	PFBS
Perfluoropentane sulfonic acid	PFPeS
Perfluorohexane sulfonic acid	PFHxS
Perfluoroheptane sulfonic acid	PFHpS
Perfluorooctane sulfonic acid	PFOS
Perfluorodecane sulfonic acid	PFDS
Perfluoroalkyl Carboxylic Acids	
Perfluorobutanoic acid	PFBA
Perfluoropentanoic acid	PFPeA
Perfluorohexanoic acid	PFHxA
Perfluoroheptanoic acid	PFHpA
Perfluorooctanoic acid	PFOA
Perfluorononanoic acid	PFNA
Perfluorodecanoic acid	PFDA
Perfluoroundecanoic acid	PFUnDA
Perfluorododecanoic acid	PFDoDA
Perfluorotridecanoic acid	PFTrDA
Perfluorotetradecanoic acid	PFTeDA
Perfluoroalkyl Sulfonamides	
Perfluorooctane sulfonamide	FOSA
N-Methyl perfluorooctane sulfonamide	MeFOSA
N-Ethyl perfluorooctane sulfonamide	EtFOSA
N-Methyl perfluorooctane sulfonamidoethanol	MeFOSE
N-Ethyl perfluorooctane sulfonamidoethanol	EtFOSE
N-Methyl perfluorooctane sulfonamidoacetic acid	MeFOSAA
N-Ethyl perfluorooctane sulfonamidoacetic acid	EtFOSAA
Fluorotelomer Sulfonic Acids	
4:2 Fluorotelomer sulfonic acid	4:2 FTS
6:2 Fluorotelomer sulfonic acid	6:2 FTS
8:2 Fluorotelomer sulfonic acid	8:2 FTS
10:2 Fluorotelomer sulfonic acid	10:2 FTS

3. Assessment criteria

The focus of the Preliminary Sampling is on PFASs which are regarded as the key contaminants of potential concern for the site.

A national consensus has not yet been reached on appropriate investigation levels for PFASs in soil, sediment, groundwater or surface water in Australia. In the interim, use of the following is considered appropriate and has been adopted as the basis for this assessment:

- *Australian Department of Health 2017, Health Based Guidance Values for PFAS – For use in site investigations in Australia*. Human health screening levels were developed by Food Standards Australia New Zealand (FSANZ) on behalf of the Australian Government Department of Health for concentration of PFOS/PFHxS[1] and PFOA in drinking water and recreational water.
- *GHD (2017).* PFAS Investigation – Derivation of PFAS soil and water criteria (GHD Reference 31\34249\256856). Based on the released interim national guidance on PFAS human health toxicity reference values by FSANZ, GHD derived PFAS criteria to be consistent with the FSANZ toxicity review, for use by Airservices.
- *GHD (2015). Airservices Australia, Managing PFC Contamination at Airports, Interim Contamination Management Strategy and Decision Framework* (GHD Reference 31\32279\239419). GHD has developed a set of interim screening levels (ISLs) for use at federally leased airport sites, based on currently available international guidelines. The ISLs include criteria for of soils, sediments, groundwater and surface water to assess protection of human health (HISLs) and ecosystems (EISLs).

The values for the adopted screening / investigation levels from these sources are summarised in Table 8 and Table 9.

Table 8 Adopted PFAS assessment screening criteria for soil/sediment

SOIL			
Exposure Scenario	PFOS	PFOA / 8:2FtS	Source
Ecological interim screening levels (EISLs) (terrestrial)	0.373 mg/kg (95% protection) 0.91 mg/kg (residential, 80% protection, low reliability) 4.71 mg/kg (commercial / industrial, 60% protection, low reliability)	3.73 mg/kg	GHD, 2015 [UK Environmental Agency 2009]
	PFOS + Perfluorohexane sulfonic acid (PFHxS)	PFOA	Source
Health-based screening criteria (HBSC) – Recreational Public Open Space	6.0 mg/kg	48 mg/kg	GHD, 2017
HBSC - Commercial/ Industrial	81 mg/kg	680 mg/kg	GHD, 2017

Table 9 Adopted PFAS assessment screening criteria for surface water and groundwater

SURFACE WATER				
	PFOS	PFOA / 8:2FtS	6:2FtS	Source
EISLs (toxicity effects on aquatic organisms)	6.66 µg/L	2900 µg/L	NA	Qi et al 2011 Giesy et al 2010
	PFOS + PFHxS		PFOA	Source
Human health interim screening levels (HISLs) (consumption of fish)	0.4 ng/L (Freshwater) 1.0 ng/L (marine water)		2.9 ng/L (Freshwater) 8.2 ng/L (marine water)	GHD 2017
Recreational water quality value	0.7 µg/L		5.6 µg/L µg/L	Australian Department of Health 2017
GROUNDWATER				
	PFOS	PFOA / 8:2FtS	6:2FtS	Source
EISLs (toxicity effects on aquatic organisms)	6.66 µg/L	2900 µg/L	NA	Qi et al 2011 Giesy et al 2010
	PFOS + PFHxS		PFOA	Source
Drinking water quality value	0.07 µg/L		0.56 µg/L	Australian Department of Health 2017

In most cases, the assessment of ecological impact will relate to the discharge of groundwater to a surface water, and impact on the aquatic ecosystems of the surface water. When assessing risk to surface waters, consideration should be given to the flux of the chemical in groundwater, the resulting dilution that will occur in the surface water and the existing PFAS concentrations in the surface water. This can then be compared to the surface water screening values above. However, in this case, where the groundwater flux to surface water is not understood, the groundwater results are compared to the adopted assessment screening levels above directly without dilution.

4. Results

The following sections summarise the field observations and analytical results of the Preliminary Sampling. Sample locations are shown in Figure 2 of Appendix A. Interpretation and discussion of the results has been provided in Section 6.

4.1 Soil

4.1.1 Field observations

Soil samples were collected from boreholes and surface soils. The soil field observations are presented in the borehole logs and soil field observations sheets contained in Appendix C and Appendix E.

Soil borelogs typically included soils characterised as sandy material with silt and limited instances of fine gravels, while surface soils were typically characterised as being of silty sand material.

4.1.2 Analytical results

The tabulated analytical results of soil samples are presented in Appendix F and laboratory reports are provided in Appendix H.

Fate and transport indicators

Particle size distribution

Three soil samples were submitted for particle size distribution (PSD) analysis. The samples had a typical sand content of between 82 and 99%, ranging from fine to medium grained, which was generally consistent with observations made in the field.

Physico-chemical parameters

- The total organic carbon (TOC) results of the soil samples ranged from 0.1% (GW06-1.0) to 4.24% (GW02-0.8).
- Cation Exchangeable Capacity (CEC) of the soil samples ranged from 0.2 meq/100g (GW06-1.0) to 8.2 meq/100g (GW02-0.8).

Metals/Metalloids and minerals

The concentrations of most metals in the analysed soil samples were less than or close to the laboratory limit of reporting (LOR), with the exception of the following:

- Aluminium results ranged from < 50 (GW06-1.0) to 4480 mg/kg (SS2)
- Iron concentrations ranged from <50 (GW04-1.0 and GW06-1.0) to 2710 mg/kg (SS2)
- Silica (Silicon Dioxide) of the soil bore samples ranged from 82.4 (GW05-0.2) to 99.7 % (GW06-1.0)

There was no discernible difference in soil bore and surface soil metal results.

PFASs

Detectable concentrations (>laboratory LOR) were only reported in the shallow soil samples collected (SS1 to SS6) where total PFAS concentrations ranged from 0.001 (SS6) to 0.0616 mg/kg (SS3). All measured concentrations of PFASs in soils were below the adopted screening criteria.

4.2 Groundwater

4.2.1 Field observations and parameters

During drilling of the soil boreholes, groundwater was encountered at depths ranging from 1.5 to 2.7 mbgl.

Groundwater field physicochemical parameters (i.e. temperature, DO, pH, ORP and EC) were recorded during the sampling process and results recorded on field purging sheets, which are presented in Appendix D. The groundwater field physicochemical results are also presented in Table 3 in Appendix F, and are summarised as follows:

- The groundwater pH results ranged between pH 4.7 (GW03) to pH 5.73 (GW04) indicating acidic groundwater conditions
- Field EC measurements indicated fresh conditions, ranging from 92.2 µS/cm (GW06) to 710 µS/cm (GW05)

4.2.2 Analytical results

The tabulated analytical results of groundwater samples are provided in Appendix F, and are summarised in the following sections.

Physico-chemical parameters

- TDS results of the groundwater samples were generally consistent with field EC measurements, and ranged from 124 mg/L (GW04) to 2080 mg/L (GW05).
- The major ion results were consistent with TDS results, where higher TDS results are accompanied with greater chloride, magnesium and sodium concentrations.

PFASs

Five out of six groundwater samples reported concentrations of PFASs less than laboratory LOR.

The sample from GW06 reported detectable levels of PFASs, with total PFAS reported at 0.23 µg/L. Detectable PFASs included PFOS, PFOA, PFHxS and PFHxA. One groundwater sample (GW06) contained a PFOS & PFHxS (sum) result (0.11 µg/L) which exceeded the adopted FSANZ drinking water criteria (0.07 µg/L).

4.2.3 Groundwater levels and flow direction

Standing water levels (SWL) of the groundwater monitoring wells during this GME ranged between 0.905 m (GW06) and 2.716 m bToC (GW02).

All new monitoring wells (GW01 to GW06) were surveyed to m AHD. The survey results were used to calculate groundwater elevations at each monitoring well during gauging. The groundwater elevations are summarised in Appendix D. Groundwater elevations were used for the preparation of an inferred groundwater contour plan (Figure 3 in Appendix A).

The surveyed groundwater elevations were calculated to be between 0.579 (GW02) and 2.356 mAHD (GW06). Based on the groundwater elevations, groundwater on the north eastern portions of the site appears to flow towards the Pacific Ocean, while groundwater on the western portion appears to flow towards the north-west (Wallum Health Conservation Area) and the southern portion of the site appears to flow towards the south (Creek that runs into Paynter River/Maroochy River).

4.3 Surface water

4.3.1 Field observations and parameters

The surface water samples (SW01 – SW04) collected from the open drains were typically pale yellow, with low turbidity and suspended solids.

Field physico-chemical measurements indicated the following:

- pH readings of the surface water samples ranged between pH 4.03 (SW01) and pH 6.28 (SW04), indicating a slight acidic to acidic environment.
- Field EC measurements of the surface water at SW01 (364.1 µS/cm) and SW02 (423.7 µS/cm) were fresh, while surface water samples SW03 (4574 µS/cm) and SW04 (13,329 µS/cm) were brackish to saline.

4.3.2 Analytical results

Four surface water samples were analysed by the primary lab for the extended PFASs suite.

Physico-chemical parameters

- TDS results of the surface water samples were generally consistent with field EC measurements, ranged from 177 mg/L (SW01) to 7920 mg/L (SW04).
- Elevated TDS results were generally accompanied with relatively high sodium, calcium, magnesium, sulfate and chloride results.

PFASs

- Surface water samples have reported PFAS results less than laboratory LOR, except for SW03 where detectable PFOS and PFOA were reported.
- The LORs for PFOS & PFHxS(sum) and PFOA (0.01 µg/L) were greater than the adopted HISL for fish consumption (freshwater and marine water) and consequently all results are reported as above the adopted PFOS guideline level.
- All results were below the EISL (toxicity effects in aquatic organisms) and the FSANZ recreational water guideline criteria.

5. Quality assurance and quality control

A summary of the Quality Assurance and Quality Control (QA/QC) Data Quality Indicators (DQIs) used for the Preliminary Sampling and an assessment of the compliance of the data set with these QA/QC DQIs is provided in Table 10. Appendix G of this report contains further details of the QA/QC assessment program.

Table 10 Summary of QA/QC Compliance

Item	Objective	Reference	Summary of Results	Compliance
Comparison of field and analytical data	Agreement between visual and olfactory evidence with laboratory results		Field observations correspond with the laboratory results	Yes
Calibration of field instruments	Meet calibration specifications	AS4482.1-2005	Calibration certificates included Refer to Appendix I	Yes
Chain of Custody documentation	Completed		Completed in full Refer to Appendix H	Yes
Sample analysis and extraction holding times	Comply with holding times	AS4482.1-2005/NEPM (2013)	All except pH and TDS in surface water samples due to short holding times. Refer to Appendix G	Yes
Sample Preservation	Samples are collected in appropriately preserved containers		All criteria met	Yes
Analysis of intra-laboratory duplicate samples	1 for every 20 samples RPD 30% - 50%	AS4482.1-2005	Refer to Appendix G	Yes
Analysis of inter-laboratory duplicate samples	1 for every 20 samples RPD 30% - 50%	AS4482.1-2005	Refer to Appendix G	Yes. Some exceedances due to sample heterogeneity and different analytical machinery/ method used between the two laboratories
Analysis of laboratory method blanks	No contamination of blanks	NEPM (2013)	All analytes were less than the laboratory LOR for ALS	Yes

Item	Objective	Reference	Summary of Results	Compliance
Analysis of matrix and laboratory control spikes	Recoveries within the laboratory specified recovery limits	NEPM (2013)	Refer to Appendix G	Yes
Analysis of laboratory surrogates	No surrogate recovery outliers	NEPM (2013)	Refer to Appendix G	Yes.
Analysis of laboratory duplicates	Frequencies and Relative Percent Differences (RPDs) within guideline and internal laboratory limits	NEPM (2013)	Refer to Appendix G	Yes

Based on the field and laboratory QA/QC program undertaken, the results indicate that the data was considered to be reasonable and of sufficient quality to meet the data quality objectives for this investigation.

6. Discussion

6.1 Summary of results

The PFAS results reported were either less than laboratory LOR or at low detectable levels. The highest PFAS concentrations were reported at the former fire station area (surface soil SS3 and groundwater well GW06).

The PFAS concentrations in the surface water samples were below the LOR, excluding SW03 which is located downstream from the current fire station.

6.2 Sources

Primary potential sources of PFASs include the current and former fire station. Other sources/uses may include previous training or releases of AFFF due to spills or crash incidents in other parts of the airport (GHD, 2016a).

With the cessation of use of PFAS-containing AFFF, the primary source has been removed. Secondary sources of PFASs remaining at the site include contaminated infrastructure (e.g. concrete pads and drains) as well as residual soil, sediment and groundwater contamination.

Based on the results, the secondary sources of PFAS on site may include the following:

- Area in front of the former fire station impacted by PFAS due to historical spills or training
- Drainage line in front of the new fire station due to historical AFFF spills

These areas may act as an ongoing secondary source of PFASs contamination to both drains and groundwater.

6.3 Migration

A summary of the PFASs (and their carbon chain length) found in each media analysed is provided in Table 11.

Table 11 Detectable PFASs in various media at the SCA

Soil - surface	C#[3]	Groundwater	C#	Surface water	C#
PFHxA	5	PFHxS	6	PFOA	7
PFPeA	5	PFHxA	6	PFOS	8
PFHxA	6	PFOA	7		
PFHxS	6	PFOS	8		
PFHpA	6				
PFOA	7				
PFOS	8				
8:2 FtS	8				
PFNA	8				
FOSA	8				
PFDA	9				
PFUnDA	10				
PFDS	10				
10:2 FTS	10				
PFDoDA	11				
PFTrDA	12				

6.3.1 Soil to groundwater

The PFASs present in surface soil samples (refer to Table 11) ranged from short (five perfluorinated carbons) to long chain (12 perfluorinated carbons), with PFOS being the dominant species present. This is consistent with a PFOS-dominant AFFF product. The surface samples were collected close to the fire station building and at areas where AFFF was known to have been previously released.

PFASs were not detected in any of the soil samples collected from GW01 to GW06. However, low levels of PFAS were reported in one of the groundwater sample from GW06, near the former fire station, comprising short perfluorinated carbon species (six to eight perfluorinated carbons). This suggests some PFAS contamination resulted from historical activities at the former fire station. The lack of PFASs reported in the soil samples from GW06 may be due to changes in landscape and development at the area over the years (GHD, 2016a).

[3] C# only accounts for the number of perfluorinated carbons in the PFAS

The lack of the longer chain PFASs in the groundwater sample from GW06 may reflect two properties of PFASs:

- Longer chain PFASs have a greater potential to sorb readily to soil particles than shorter chain compounds
- Longer chain PFASs have lower solubilities than shorter chain compounds

PFASs have been shown to sorb readily to organic material in an aquifer. Analysis of TOC was conducted to assess the relationship between PFASs and TOC. A possible positive relationship was observed in soil samples which indicated surface samples may attenuate PFOS more than deeper soils as these contained, on average, higher TOC than the deeper samples. Some studies have found high silica sand and high iron sand can also serve as good sorption sites for PFASs (Arcadis, 2016). However, no relationships were observed between iron, silica and PFASs. This lack of a clear relationship is likely due to the low organic carbon content of the soils, the competition for the limited available sorption site by other solutes, and the low concentrations of PFASs in soil.

6.3.2 Surface water

Detectable PFASs (PFOS and PFOA) were reported in one of the surface water samples (SW03) collected from the open drains downstream from the current fire station. This is likely to be the residual impact of a historical spill reported in the PSI report (GHD, 2016a). Due to the shallow groundwater levels, interaction between the groundwater and surface water environment is likely. However, due to the absence of PFASs detected in the groundwater well located near the current fire station, the low level of PFAS reported in the surface water is likely migration of PFAS from surface runoff.

6.3.3 Groundwater

One groundwater sample (GW06) contained a PFOS & PFHxS (sum) result (0.11 µg/L) which exceeded the adopted FSANZ drinking water criteria (0.07 µg/L). The migration of PFASs through an aquifer to a receiving water body is a complex process. Attenuation of PFASs migration at the SCA is likely to be controlled predominantly by aquifer properties and tidal influences. Biodegradation is not considered a significant attenuation mechanism, particularly for PFOS and PFOA. Moreover, due to the sandy unconfined aquifer at the site, the hydraulic conductivity of the aquifer is expected to be relatively high.

As discussed above, the sorption capacity of the aquifer may be relatively low at the site, particularly in relation to organic material.

7. Summary

Based on the data reviewed in this study, the following summary is made:

- The primary source (use of AFFF containing PFAS) no longer exists. Secondary sources include residual soil and groundwater contamination, notably at the former fire station and the current fire station.
- Soil results reported PFAS concentrations either below the laboratory LOR or adopted human health and ecological guidelines, indicating that in the areas sampled, soils do not present an unacceptable risk to human health and ecological receptors.
- One groundwater sample GW06 (near old fire station) has reported PFOS & PFHxS (sum) greater than the adopted drinking water criteria. As the site is located in an urbanised setting where council water supply is available, it is unlikely that groundwater onsite is extracted for potable purposes. Therefore, the likelihood of human health exposure via drinking water is considered low.
- Surface water samples reported concentrations of PFASs below the ecological and recreational guidelines. However, it is noted that the HISL for consumption of fish is lower than the laboratory limit of reporting.

8. References

Airports Act 1996

Airports (Environment Protection) Regulations 1997

Australian Standard AS 4482.1:2005: Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil

Arcadis, 2016. Environmental fate and effects of poly- and perfluoroalkyl substances (PFAS), report no. 8/16, CONCAWE

AS/NZS ISO 31000:2009: Risk management - Principles and guidelines

Australian Commonwealth Work Health and Safety Act 2011

Commonwealth Work Health and Safety Regulations 2011

EnHealth, 2016. *enHealth Statement: Interim National guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia*

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

GHD, 2016a. Preliminary Site Investigation, Alice Springs Airport, Airservices Australia. (GHD Reference 31\34071\252960)

GHD, 2016b. Airservices Australia, Alice Springs Airport Sampling Analysis and Quality Plan (GHD reference 31/34071/252997)

GHD, 2016c. PFAS Investigations – Derivation of PFAS Soil Criteria (GHD Reference 31\34249\254439)

GHD, 2017. PFAS Investigation – Derivation of PFAS soil and water criteria (GHD Reference 31\34249\256856)

Government of Western Australia, Department of Environmental Regulation (DER), 2016: Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

Environmental Protection Act 1994 (EP Act)

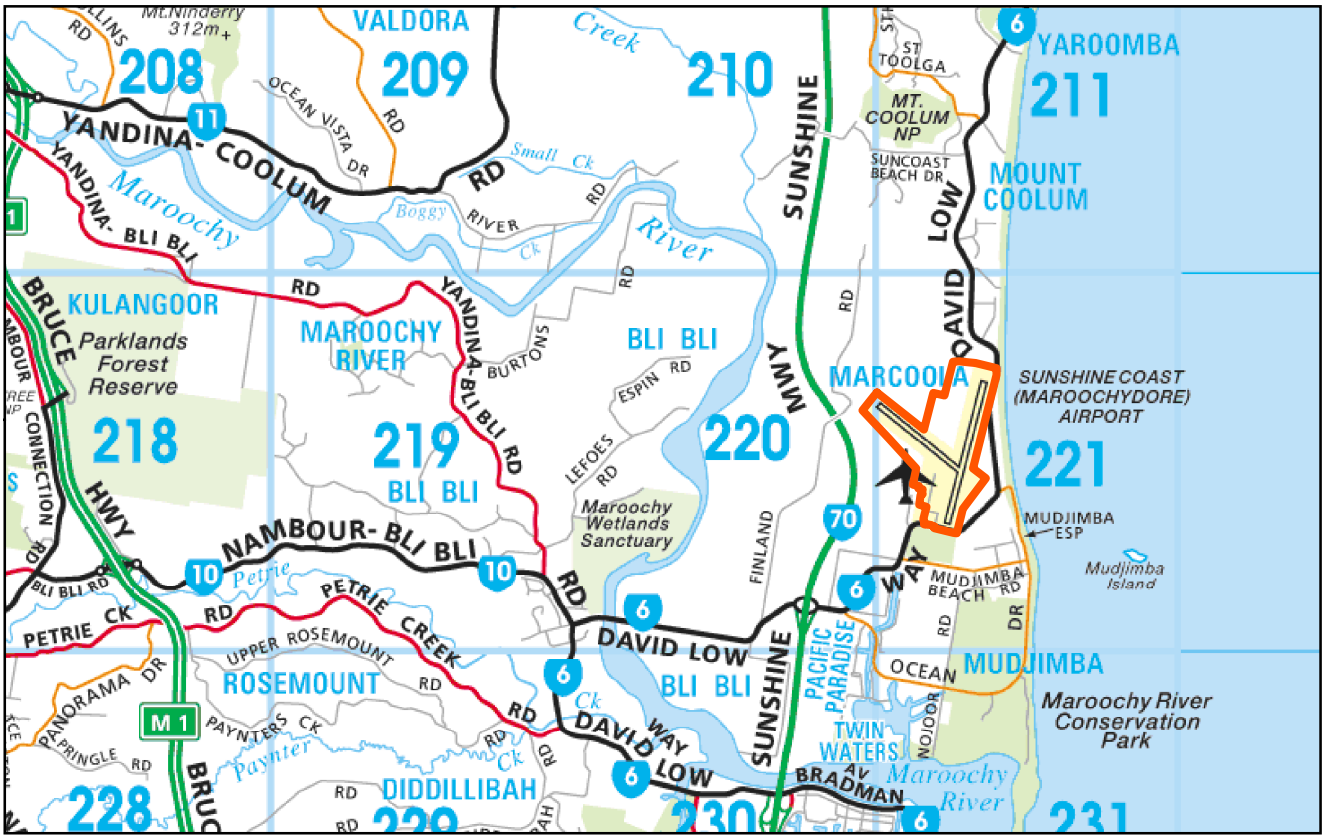
National Environment Protection Council (NEPC), 1999. *National Environment Protection (Assessment of Site Contamination) Measure, as amended in 2013* (the ASC NEPM)

Qi P, Wang Y, Mu J and Wang J 2011. Aquatic predicted no-effect-concentration derivation for Perfluorooctane sulfonic acid. *Environmental Toxicology and Chemistry*. 30(4):836-842

UK Environment Agency 2009. Evidence: Review of human health and environmental risks associated with land application of mechanical-biological treatment outputs (Revision 1) Report: SC030144/R5

Appendices

Appendix A – Figures



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Metres

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

N

GHD airservices

Airservices Australia Pty Ltd
Sunshine Coast Airport
Preliminary Sampling Report

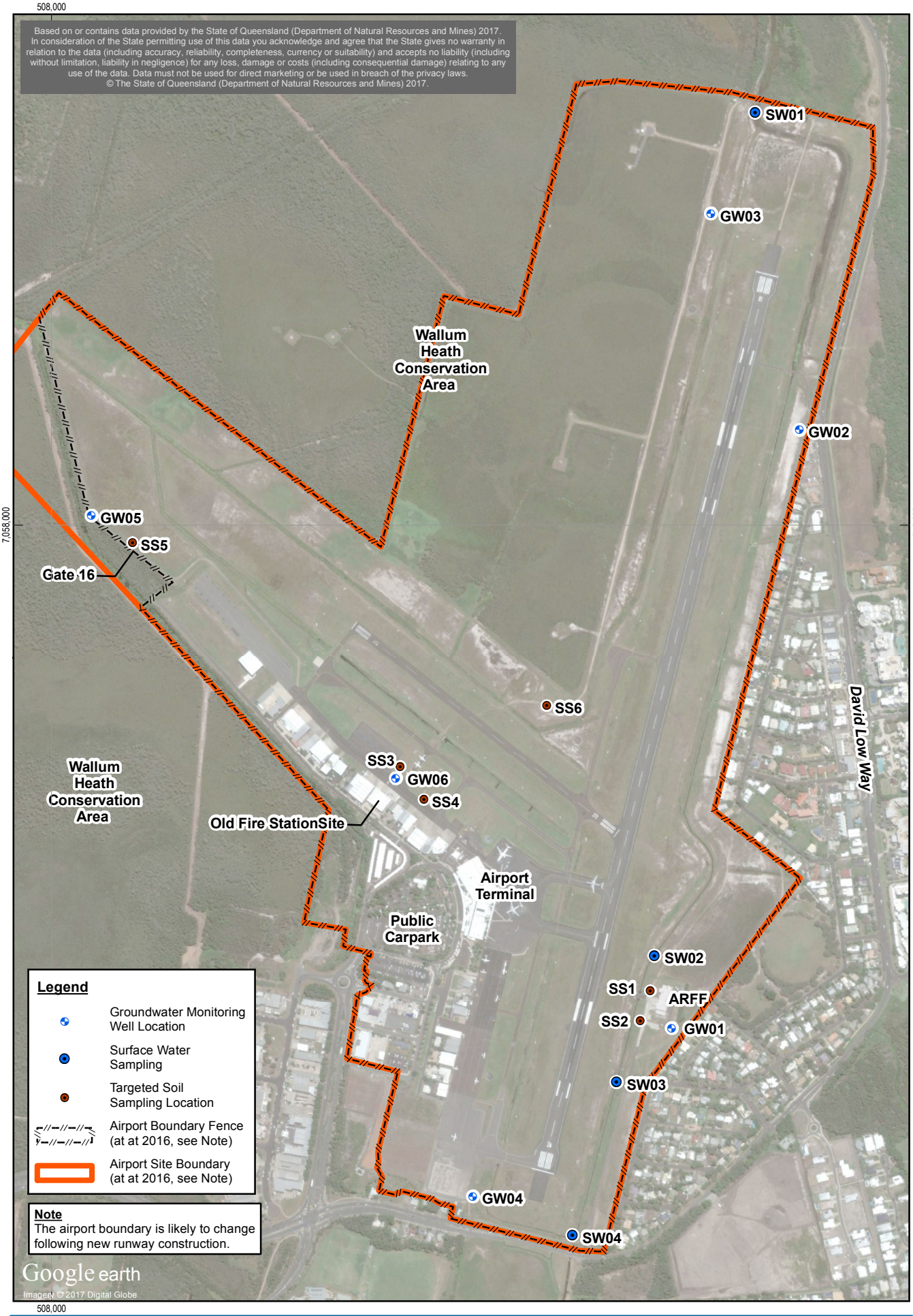
Job Number	31-34249
Revision	A
Date	21 Feb 2017

Site Locality

Figure 1

N:\AU\Melbourne\Projects\31\34249\GIS\Maps\Working\Maroochydore\PrelimSampling\31-34249-101_Locality_Mdore_revA.mxd145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com.au W www.ghd.com

Data Source: DMRM: cadastre (2016); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc



1:10,000 (at A4)
0 100 200 300 400
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD airservices

Airservices Australia Pty Ltd
Sunshine Coast Airport
Preliminary Sampling Report

Sampling Locations (December 2016)

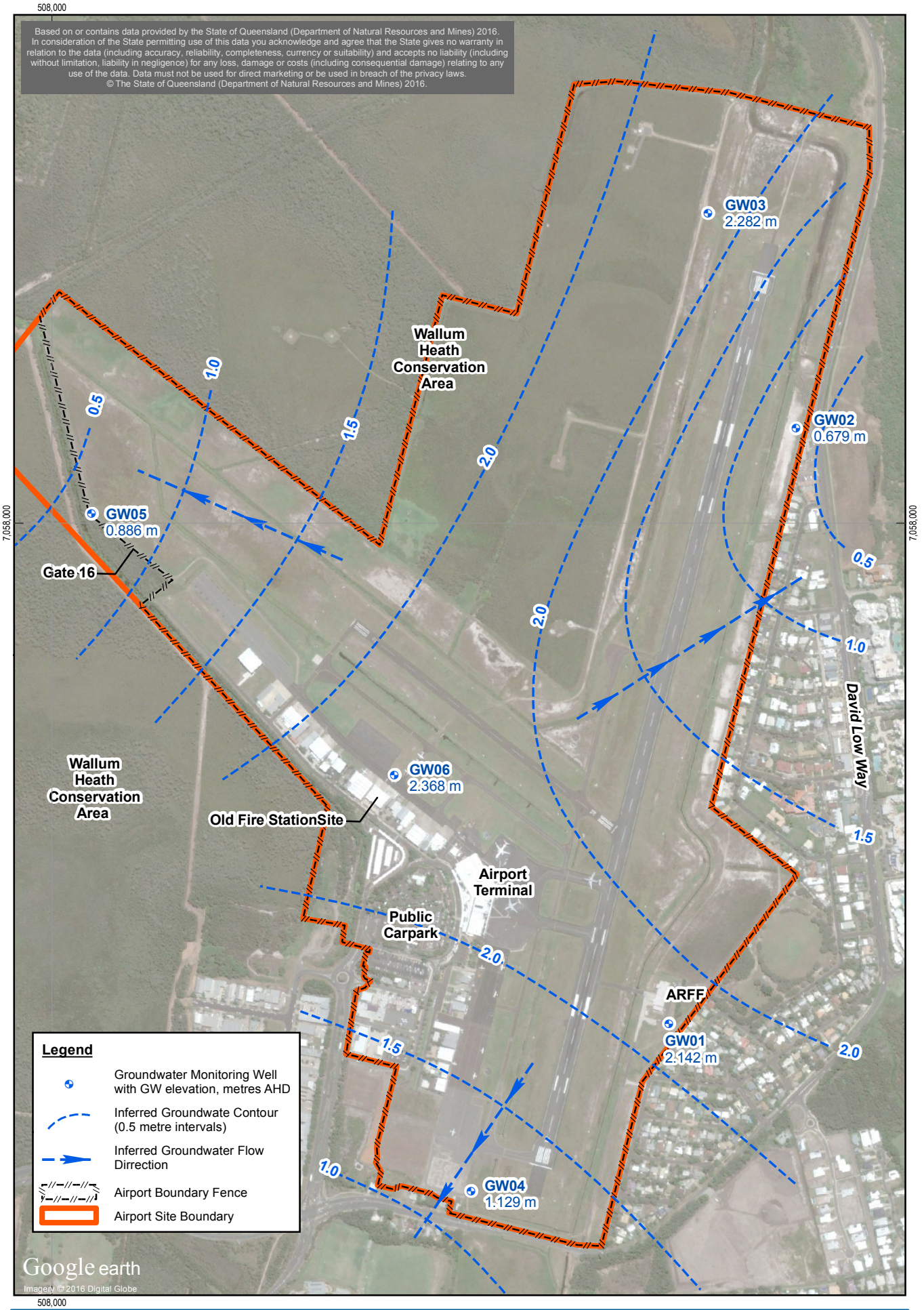
Job Number	31-34249
Revision	A
Date	21 Feb 2017

Figure 2

N:\AU\Melbourne\Projects\31\34249\GIS\Maps\Working\Maroochydore\PrelimSampling\31-34249-102_sampling_Dec2016_Mdore_revA.mxd

145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com.au W www.ghd.com

Data Source: DMRM: cadastre (2016); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc



1:10,000 (at A4)

0 100 200 300 400

Metres

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

N

GHD airservices

Airservices Australia Pty Ltd
Sunshine Coast Airport
Preliminary Sampling Report

Job Number 31-34249
Revision A
Date 23 Dec 2016

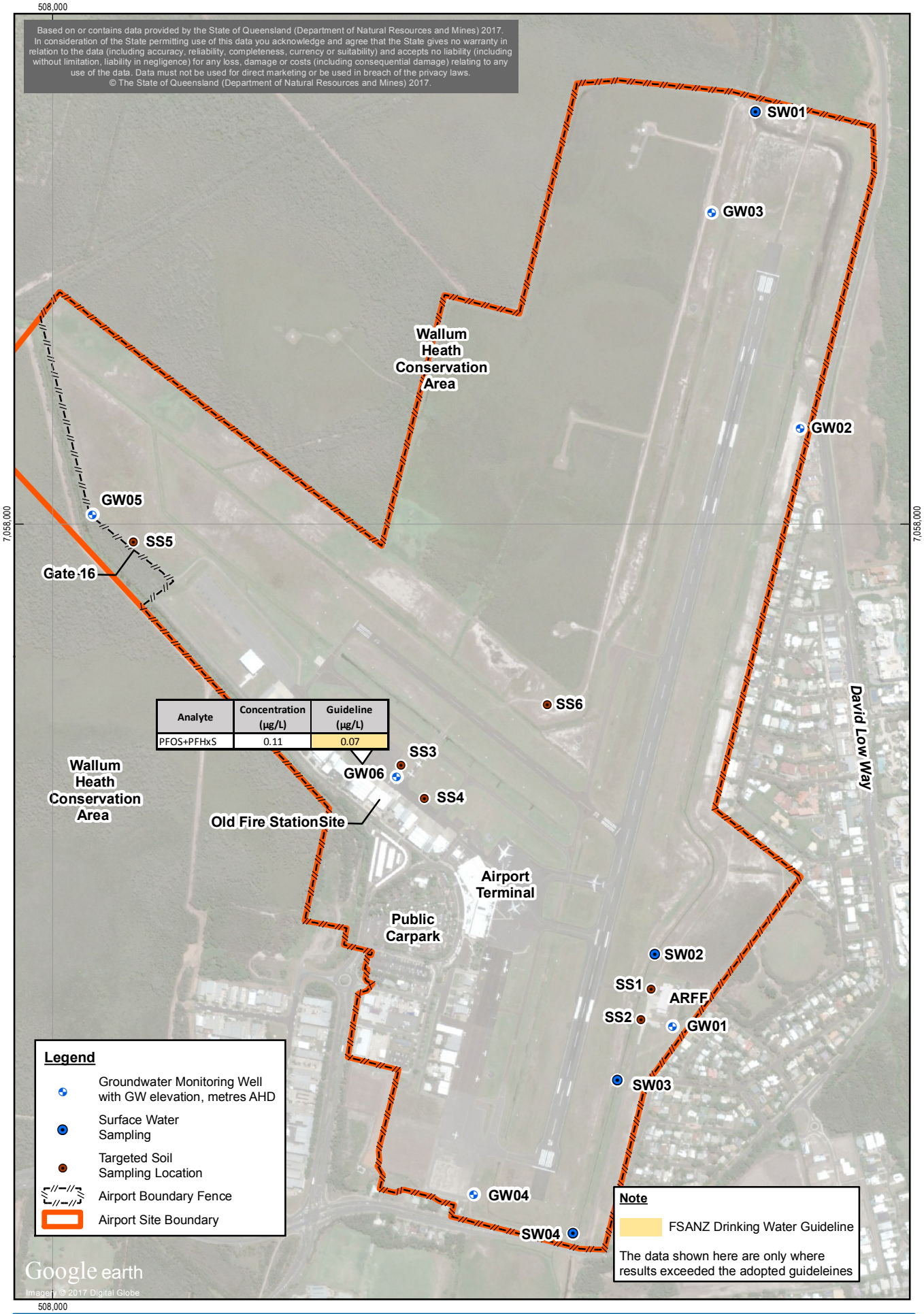
Inferred Groundwater Contours (December 2016)

Figure 3

N:\AU\Melbourne\Projects\31\34249\GIS\Maps\Working\Maroochydore\PrelimSampling\31-34249-103_GME_Dec2016_Mdore_revA.mxd

145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com.au W www.ghd.com

Data Source: DMRM: cadastre (2016); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc



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0 100 200 300 400

Metres

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

N

GHD

airservices

Airservices Australia Pty Ltd
Sunshine Coast Airport
Preliminary Sampling Report

Exceedances Results Summary

Job Number	31-34249
Revision	A
Date	13 Jul 2017

Figure 4

N:\AU\Melbourne\Projects\31\34249\GIS\Maps\Working\Maroochydore\PrelimSampling\31-34249-104_results_Jul2017_Mdore_revA.mxd

145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com.au W www.ghd.com

Data Source: DMRM: cadastre (2016); Google Earth: imagery (May 2015, extracted Jul 2016). Created : jvc

Appendix B – Borehole Logs

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW01

Client ASA
Project ASA PFAS Investigation
Project No. 313424900
Site Sunshine Coast Airport
Location Sunshine Coast
Date Drilled 16/11/2016 - 16/11/2016

Drill Co. Proactive Drilling
Driller Phil
Rig Type Geoprobe 7822DT PD508
Drill Method
Total Depth (m) 3.1
Diameter (mm) 200

Easting, Northing 509204.623, 7057023.723
Grid Ref GDA94_MGA_zone_56
Elevation 3.363
Collar RL 3.997
Logged By B.N
Checked By T.H

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion** Monument standpipe

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		GW01_0.0		Grout		SAND WITH SILT, fine grained, grey	D	L	No odour, no staining, roots present	3
			GW01_0.2		Bentonite		SAND, fine grained, dark grey	M	L	No odour, no staining	
0.5			GW01_0.5				SAND, fine grained, white grey	M	L	No odour, no staining	2.5
1			GW01_1.0				SAND WITH SILT, fine grained, dark brown	M/W	L	No odour, no staining	
1.5	SFA				Filter Sand						2
2											1.5
2.5							COFFEE ROCK, fine to medium grained sand, dark brown, with silt	W	D	No odour, no staining	1
3			GW01_3.1								0.5
							Termination Depth at:3.10 m				0
3.5											
4											-0.5
4.5											-1
5											-1.5
5.5											-2
											-2.5

Notes

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

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

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW02

Client ASA
Project ASA PFAS Investigation
Project No. 313424900
Site Sunshine Coast Airport
Location Sunshine Coast
Date Drilled 16/11/2016 - 16/11/2016

Drill Co. Proactive Drilling
Driller Phil
Rig Type Geoprobe 7822DT PD508
Drill Method
Total Depth (m) 4.5
Diameter (mm) 200

Easting, Northing 509452.634, 7058185.288
Grid Ref GDA94_MGA_zone_56
Elevation 2.602
Collar RL 3.295
Logged By B.N
Checked By T.H

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion** Monument standpipe

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	NDD		GW02_0.0		Grout		SAND, fine grained, pale grey-white	M	L	No odour, no staining	2.5
			GW02_0.2								
0.5			GW02_0.5		Bentonite						2
	SFA		GW02_0.8				SAND WITH SILT, fine to medium grained sand, dark brown, bands of coffee rock	M	D	No odour, no staining	
1											1.5
1.5											1
2			GW02_2.0								0.5
2.5					Filter Sand						0
3			GW02_3.0								-0.5
3.5											-1
4											-1.5
4.5			GW02_4.5				Termination Depth at:4.50 m				-2
5											-2.5
5.5											-3

Notes

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

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

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW03

Client ASA
Project ASA PFAS Investigation
Project No. 313424900
Site Sunshine Coast Airport
Location Sunshine Coast
Date Drilled 16/11/2016 - 16/11/2016

Drill Co. Proactive Drilling
Driller Phil
Rig Type Geoprobe 7822DT PD508
Drill Method
Total Depth (m) 3.5
Diameter (mm) 200

Easting, Northing 509280.791, 7058605.642
Grid Ref GDA94_MGA_zone_56
Elevation 3.414
Collar RL 3.912
Logged By B.N
Checked By T.H

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion** Monument standpipe

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	NDD		GW03_0.0		Grout		SAND, fine grained, grey	D	L	No odour, no staining	3.4
			GW03_0.2		Bentonite		SAND, dark grey	D/M	L	No odour, no staining	
0.5			GW03_0.5				SAND WITH SILT, fine grained sand, dark brown	M	MD	No odour, no staining	3
1											2.5
1.5	SFA			▽							2
2			GW03_2.0		Filter Sand		SAND WITH SILT, fine grained sand, dark brown	W	MD	No odour, no staining	1.5
2.5											1
3			GW03_3.0								0.5
3.5			GW03_3.5								0
							Termination Depth at:3.50 m				
4											-0.5
4.5											-1
5											-1.5
5.5											-2
											-2.5

Notes

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

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

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW04

Client ASA
Project ASA PFAS Investigation
Project No. 313424900
Site Sunshine Coast Airport
Location Sunshine Coast
Date Drilled 17/11/2016 - 17/11/2016

Drill Co. Proactive Drilling
Driller Phil
Rig Type Geoprobe 7822DT PD508
Drill Method
Total Depth (m) 4
Diameter (mm) 200

Easting, Northing 508818.351, 7056696.477
Grid Ref GDA94_MGA_zone_56
Elevation 2.181
Collar RL 2.894
Logged By B.N
Checked By T.H

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion** Monument standpipe

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	NDD		GW04_0.0		Grout		SILTY SAND, fine grained sand, dark grey	D/M	L	No odour, no staining, roots present	2
			GW04_0.2		Bentonite						
0.5			GW04_0.5				SAND WITH SILT, fine grained sand, grey, trace medium subrounded gravel	M	L	No odour, no staining	1.5
							SAND WITH SILT, fine to medium grained sand, grey-brown, trace medium subrounded gravel, trace cream sand	W	L	No odour, no staining	
1			GW04_1.0				SAND WITH SILT, fine grained sand, dark brown	W	MD	No odour, no staining	1
1.5	HFA										0.5
2			GW04_3.0		Filter Sand						0
2.5											-0.5
3											-1
3.5											-1.5
4			GW04_4.0				Termination Depth at:4.00 m				-2
4.5											-2.5
5											-3
5.5											-3.5

Notes

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

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

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW05

Client ASA
Project ASA PFAS Investigation
Project No. 313424900
Site Sunshine Coast Airport
Location Sunshine Coast
Date Drilled 16/11/2016 - 16/11/2016

Drill Co. Proactive Drilling
Driller Phil
Rig Type Geoprobe 7822DT PD508
Drill Method
Total Depth (m) 4
Diameter (mm) 200

Easting, Northing 508077.546, 7058018.929
Grid Ref GDA94_MGA_zone_56
Elevation 2.38
Collar RL 3.06
Logged By B.N
Checked By T.H

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion** Monument standpipe

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	NDD		GW05_0.0		Grout		SILTY SAND, fine grained sand, grey	D	L	No odour, no staining	2
			GW05_0.2		Bentonite						
0.5			GW05_0.5				SAND, fine grained, cream-pale grey	M	L	No odour, no staining	1.5
							SAND, fine grained, cream and dark brown, trace silt	M	MD	No odour, no staining	
1			GW05_1.0				SAND, fine grained, dark brown, with silt	W	MD	No odour, no staining	1
1.5	HFA										0.5
2			GW05_3.0		Filter Sand						0
2.5											
3											-0.5
3.5			GW05_3.5								-1
											-1.5
4			GW05_4.0				Termination Depth at:4.00 m				-2
4.5											
5											-2.5
											-3
5.5											-3.5

Notes

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

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

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW06

Client ASA
Project ASA PFAS Investigation
Project No. 313424900
Site Sunshine Coast Airport
Location Sunshine Coast
Date Drilled 17/11/2016 - 17/11/2016

Drill Co. Proactive Drilling
Driller Phil
Rig Type Geoprobe 7822DT PD508
Drill Method
Total Depth (m) 4
Diameter (mm) 200

Easting, Northing 508668.463, 7057508.742
Grid Ref GDA94_MGA_zone_56
Elevation 3.334
Collar RL 3.261
Logged By B.N
Checked By T.H

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion** Flush mounted gatic

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	NDD		GW06_0.0		Grout		SILTY SAND, fine grained, grey	D	L	No odour, no staining, grass on surface	3
			GW06_0.2		Bentonite						
0.5			GW06_0.5				SAND, fine to medium grained, cream-pale grey	M	L	No odour, no staining	2.5
1			GW06_1.0				SAND, fine to medium grained, grey	W	MD	No odour, no staining	
1.5	HFA						SAND WITH SILT, fine to medium grained sand, dark brown	W	MD	No odour, no staining	2
2			GW06_2.0		Filter Sand						1.5
2.5											1
3			GW06_3.0								0.5
3.5											0
4			GW06_4.0				Termination Depth at:4.00 m				-0.5
4.5											-1
5											-1.5
5.5											-2
											-2.5

Notes

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

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

Appendix C – Groundwater Well Survey Data

Survey Point Number	Easting	Nothing	RL (AHD)	Description
1000	509204.623	7057023.723	3.363	GW01 Top Concrete Base
1003	509204.553	7057023.689	3.997	GW01 Top Sampling Pipe
2002	509452.634	7058185.288	2.602	GW02 Top Concrete Base
2003	509452.718	7058185.420	3.295	GW02 Top Sampling Pipe
2004	509280.791	7058605.642	3.414	GW03 Top Concrete Base
2006	509280.800	7058605.586	3.912	GW03 Top Sampling Pipe
2007	508077.546	7058018.929	2.380	GW05 Top Concrete Base
2008	508077.550	7058018.848	3.060	GW05 Top Sampling Pipe
2009	508668.463	7057508.742	3.334	GW06 Top Concrete Base
2010	508668.391	7057508.800	3.261	GW06 Top Sampling Pipe
2012	508818.351	7056696.477	2.181	GW04 Top Concrete Base
2014	508818.379	7056696.476	2.894	GW04 Top Sampling Pipe

Datum: MGA Zone 56 Vide Cors Network
AHD Vide Airport Datum, PSM 88360 & PSM154512

Appendix D – Groundwater Gauging and Purging Records

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW01
Project Number: 3134249	
Project Name: Sunshine Coast Airport Preliminary Sampling	Sample ID: GW01
Client: ASA	Date: 29/11/2016 Time:08:58
Site: Sunshine Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Road Box, fine.	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.855	Sample Method: Low Flow
Depth of PSH (from TOC): NA	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 3.1	Well Diameter: 50 mm
Casing Stickup: Monument	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 1.865	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Redox (mv)	Temp (^{0}C)	Comments
9:00	0	1.87	0.21	213.4	5.27	-91.3	27.7	Dark Brown, high Turbidity/suspended solids
9:05	0.3	1.87	0.2	161.1	5.11	-86.8	27.6	
9:15	1	1.875	1.51	156.9	5.14	-98.7	27.7	
9:20	2	1.875	2.07	156.5	5.13	-101.7	27.6	
9:25	3	1.874	2.26	155.5	5.13	-103.6	27.6	
9:30	4	1.874	2.32	155.4	5.13	-105.6	27.7	(Sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

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

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW02
Project Number: 3134249	
Project Name: Sunshine Coast Airport Preliminary Sampling	Sample ID: GW02
Client: ASA	Date: 29/11/2016 Time:10:07
Site: Sunshine Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Road Box, fine.	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.716	Sample Method: Low Flow
Depth of PSH (from TOC): NA	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 4.5	Well Diameter: 50 mm
Casing Stickup: Monument	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 2.730	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Redox (mv)	Temp (^{0}C)	Comments
10:17	0	2.725	4.57	273.8	5.34	-65.9	26	Dark brown, high turbidity/suspended solds, anoxic odour.
10:22	0.5	2.73	0.38	267.1	5.27	-119.8	24.4	
10:27	1.5	2.728	1.98	267.7	5.28	-129.7	24.3	
10:32	2.5	2.729	2.97	268.3	5.27	-135.1	24.1	
10:37	3.5	2.725	3.27	267.5	5.26	-136.6	24.3	
10:42	4.5	2.73	3.35	267.5	5.33	-137.2	24.3	(Sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

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

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW03
Project Number: 3134249	
Project Name: Sunshine Coast Airport Preliminary Sampling	Sample ID: GW03
Client: ASA	Date: 29/11/2016 Time:10:57
Site: Sunshine Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Road Box, fine.	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.630	Sample Method: Low Flow
Depth of PSH (from TOC): NA	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 3.5	Well Diameter: 50 mm
Casing Stickup: Monument	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 1.720	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Redox (mv)	Temp (^{0}C)	Comments
11:10	0.5	1.710	0.34	152.4	4.72	39	25.5	Clear to pale yellow, low turbidity/suspended solids,
11:15	1.5	1.710	1.29	152.6	4.65	46	26.1	
11:20	2.5	1.710	1.8	152.8	4.67	37.2	26.1	
11:25	3.5	1.714	2.55	152.8	4.69	21.1	26.1	
11:30	4.5	1.716	3	152.9	4.69	13	26.1	
11:35	5.5	1.720	3.23	153.4	4.7	7	26.2	(Sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

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

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134249	**Borehole ID: GW04**
Project Name: Sunshine Coast Airport Preliminary Sampling	**Sample ID: GW04**
Client: ASA	**Date: 29/11/2016 Time:14:30**
Site: Sunshine Coast Airport	**Sampler: B.N**
Well Condition (i.e road box, locked etc): Road Box, fine.	**Purge Method: Low Flow**
Depth to Water Table Pre-purge (from TOC): 1.765	**Sample Method: Low Flow**
Depth of PSH (from TOC): NA	**Casing Type: uPVC Class 18**
Depth to Bottom of Casing (BOC) from TOC: 4.0	**Well Diameter: 50 mm**
Casing Stickup: Monument	**Calculated Bore Volume(L): -**
Depth to Water Table Post - purge (from TOC): 1.785	**QA Collected: -**

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Redox (mv)	Temp (^{0}C)	Comments
14:31	0	1.78	0.79	175.6	5.68	-58.9	25.8	Pale yellow, low turbidity/suspended solids, anoxic odour
14:37	1	1.78	0.56	177	5.72	-103.4	25.5	
14:42	2	1.785	1.92	176.9	5.73	-112.3	25.6	
14:47	3	1.785	3.3	173.9	5.68	-119.4	25.8	
14:52	4	1.785	3.76	174.9	5.69	-123.1	25.9	
14:57	5	1.785	3.93	179.3	5.73	-126.1	25.7	(Sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

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

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW05
Project Number: 3134249	
Project Name: Sunshine Coast Airport Preliminary Sampling	Sample ID: GW05
Client: ASA	Date: 29/11/2016 Time:11:56
Site: Sunshine Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Road Box, fine.	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.395	Sample Method: Low Flow
Depth of PSH (from TOC): NA	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 4.0	Well Diameter: 50 mm
Casing Stickup: Monument	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 2.430	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Redox (mv)	Temp (^{0}C)	Comments
12:01	0	2.41	0.9	675	4.97	68.1	26.6	Dark brown, high turbidity/suspended solids, anoxic odour.
12:05	0.5	2.412	0.27	682	5.03	25.7	26.5	
12:10	1.5	2.44	2.65	688	6.05	5.4	26.3	
12:16	2.5	2.44	3.77	693	6.05	-8.8	26.2	
12:22	3.5	2.435	4.44	701	5.04	-19.1	26.1	
12:27	4.5	2.435	4.6	707	5.05	-23.4	25.9	
12:32	5.5	2.44	4.77	710	5.05	-29.5	25.8	(Sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

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

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	**Borehole ID: GW06**
Project Number: 3134249	
Project Name: Sunshine Coast Airport Preliminary Sampling	**Sample ID: GW06**
Client: ASA	**Date: 29/11/2016 Time:13:46**
Site: Sunshine Coast Airport	**Sampler: B.N**
Well Condition (i.e road box, locked etc): Road Box, fine.	**Purge Method: Low Flow**
Depth to Water Table Pre-purge (from TOC): 0.905	**Sample Method: Low Flow**
Depth of PSH (from TOC): NA	**Casing Type: uPVC Class 18**
Depth to Bottom of Casing (BOC) from TOC: 4.0	**Well Diameter: 50 mm**
Casing Stickup: Monument	**Calculated Bore Volume(L): -**
Depth to Water Table Post - purge (from TOC): 0.910	**QA Collected: QA-01, QA-02**

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Redox (mv)	Temp (^{0}C)	Comments
13:44	0	0.91	1.05	100.6	5.2	-31.4	28.4	Pale yellow, low turbidiyt/suspended solids, anoxic odour
13:50	0.5	0.91	0.3	89.5	5.07	-52	28.2	Yellow, tanin stain, moderate turbidity/suspended solids, anoxic odour
13:55	1	0.912	3.25	87.5	5.08	-71.7	28.3	
14:00	2	0.914	4.45	88.4	5.16	-80.7	28.8	
14:05	3	0.915	4.76	90.1	5.2	-82.4	28.3	
14:10	4	0.915	4.89	92.2	5.25	-80.9	28.4	(Sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

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

Groundwater Gauging Sheet

Client: Airservices Australia

Project: Sunshine Coast Airport Preliminary Sampling

Job No.: 3134249

Location: Sunshine Coast Airport

WL Meter Type: Int.Fce

Date	Location / Bore ID	SWL (mbTOC)	TOC (mAHD)	SWL (mAHD)
29/11/2016	GW01	1.855	3.997	2.142
29/11/2016	GW02	2.716	3.295	0.579
29/11/2016	GW03	1.63	3.912	2.282
29/11/2016	GW04	1.765	2.894	1.129
29/11/2016	GW05	0.905	3.06	2.155
29/11/2016	GW06	1.47	3.261	1.791

Appendix E – Surface Soil and Surface Water Observation Notes

Surface Soil Samples

Client: Airservices Australia

Project: Sunshine Coast Airport Preliminary Sampling

Job No.: 3134249

Location: Sunshine Coast Airport

Location	Date	Comments
SS1	15/11/2016	Silty Sand, Brown - dark brown, fine sand, no odour, dry, loose
SS2	15/11/2016	Silty Sand, Brown - dark brown, fine sand, no odour, dry, loose
SS3	17/11/2016	Sand, Grey, fine grained, with silt, dry to moist, loose
SS4	17/11/2016	Silty Sand, Grey- brown, fine grained, dry to moist, loose
SS5	16/11/2016	Silty Sand, Dark grey, fine grained, dry, no odour.
SS6	15/11/2016	Sand, Cream - pale grey, fine grained, dry, no odour.

Surface Water Samples

Client: Airservices Australia

Project: Sunshine Coast Airport Preliminary Sampling

Job No.: 3134249

Location: Sunshine Coast Airport

Location	Date / Time	DO (%)	DO (mg/L)	EC (µS/cm)	pH	Redox (ORP or mV)	Temp (^{o}C)	Comments
SW01	15/11/2016 / 14:00	59.3	4.8	364.1	4.03	71.5	28.1	Pale orange - clear, low turbidity/suspended solids, low level of water in drain. No odour.
SW02	15/11/2016 / 14:22	60.5	4.99	423.7	5.76	41.3	29.2	Pale yellow, low turbidity/suspended solids, no odour. Lilies in water, concrete lined drain.
SW03	15/11/2016 / 14:34	58.3	4.75	4574	6.02	47	27.6	Pale yellow, very low turbidity/suspended solids, no odour. Lilies in water
SW04	15/11/2016 / 14:44	56.3	4.53	13329	6.28	45.5	28.4	Pale yellow, low turbidity/suspended solids, no odour.

Appendix F – Summary Tabulated Results

Table 1. Soil Results

				Particle Size Analysis																	Major Ions				TOC	Cations							
				Clay (<2 µm)	Silt (2-60 µm)	Sand (0.06-2.00 mm)	Gravel (>2mm)	Cobbles (>6cm)	+75µm	+150µm	+300µm	+425µm	+600µm	+1180µm	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm	Calcium	Magnesium	Potassium	Sodium	Total Organic Carbon	Exchangeable Aluminium	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC	Exchange Acidity	Magnesium/Potassium Ratio
				%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	%	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	-
EQL				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	50	50	50	50	0.02	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Airservices EISLs (terrestrial) - 95% protection																																	
Airservices EISLs (terrestrial) - com./ind., 60% protection, low reliability																																	
Airservices EISLs (terrestrial) - residential, 80% protection, low reliability																																	
GHD 2017 - Airservices HBSC - Commercial/Industrial																																	
GHD 2017 - Airservices HBSC - Recreational Public Open Space																																	
Site_ID	**Location_Code**	**Sample_Depth_Range**	**Field_ID**	**Sampled_Date_Time**																													
Sunshine Coast Airport	GW01	0.1-0.2	GW01-0.2	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	1.08	-	-	-	-	-	-	-	-
		0.4-0.5	GW01-0.5	16/11/2016	<1	1	99	<1	<1	99	97	30	6	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
		3-3.1	GW01-3.1	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	0.1	0.6	<0.1	0.1	1.7	0.9	-
				16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	0.97	-	-	-	-	-	-	-	-
	GW02	0.7-0.8	GW02-0.8	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4.7	<0.1	0.5	8.2	-	-
				16/11/2016	8	3	89	<1	<1	89	81	10	2	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<50	-	4.24	-	-	-	-	-	-	-	-
		4.4-4.5	GW02-4.5	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	0.86	-	-	-	-	-	-	-	-
	GW03	0.1-0.2	GW03-0.2	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	0.99	-	-	-	-	-	-	-	-
		1.9-2	GW03-2.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	-	-	-	-	-	-
		2.9-3	GW03-3.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.26	-	-	-	-	-	-	-	-
	GW04	0.9-1	GW04-1.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	1	<0.1	<0.1	1.1	-	-
				17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	0.29	-	-	-	-	-	-	-	-
		3.9-4	GW04-4.0	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	0.85	-	-	-	-	-	-	-	-
	GW05	0.1-0.2	GW05-0.2	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	170	-	1.31	-	-	-	-	-	-	-	-
		2.9-3	GW05-3.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	2.29	-	-	-	-	-	-	-	-
	GW06	0.9-1	GW06-1.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	<0.1	<0.1	<0.1	0.2	-	-
				17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	0.1	-	-	-	-	-	-	-	-
		3.9-4	GW06-4.0	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	0.78	-	-	-	-	-	-	-	-
	SS1	0-0.1	SS1	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SS2	0-0.1	SS2	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1.2	0.2	0.2	5.6	-	7.1
				15/11/2016	8	10	82	<1	<1	81	72	27	12	5	<1	<1	<1	<1	<1	<1	<1	-	-	170	-	2.17	-	-	-	-	-	-	-	-
	SS3	0-0.1	SS3	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SS4	0-0.1	SS4	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SS5	0-0.1	SS5	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120	-	1.44	-	-	-	-	-	-	-	-
	SS6	0-0.1	SS6	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	0.6	-
				15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																																	
Number of Results				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	14	1	14	2	6	6	6	6	6	2	1
Number of Detects				2	3	3	0	0	3	3	3	3	1	0	0	0	0	0	0	0	0	0	4	0	14	0	5	4	1	3	6	2	1
Minimum Concentration				<1	1	82	<1	<1	81	72	10	2	<1	<1	<1	<1	<1	<1	<1	<1	<50	<50	<50	<50	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.6	7.1
Minimum Detect				8	1	82	ND	ND	81	72	10	2	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	50	ND	0.1	ND	0.1	0.6	0.2	0.1	0.2	0.6	7.1
Maximum Concentration				8	10	99	<1	<1	99	97	30	12	5	<1	<1	<1	<1	<1	<1	<1	<50	<50	170	<50	4.24	<0.1	4	4.7	0.2	0.5	8.2	0.9	7.1
Maximum Detect				8	10	99	ND	ND	99	97	30	12	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	170	ND	4.24	ND	4	4.7	0.2	0.5	8.2	0.9	7.1
Average Concentration				5.5	4.7	90	0.5	0.5	90	83	22	6.7	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5			54		1.3		1.2	1.3	0.075	0.16	2.9		
Median Concentration				8	3	89	0.5	0.5	89	81	27	6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	25	25	25	25	1.035	0.05	0.1	0.8	0.05	0.075	1.4	0.75	7.1
Standard Deviation				4.3	4.7	8.5	0	0	9	13	11	5	2.6	0	0	0	0	0	0	0			55		1		1.8	1.7	0.061	0.18	3.2		
Number of Guideline Exceedances				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments
#1:GHD 2017. PFAS Investigation - Derivation of PFAS soil criteria

Table 1. Soil Results

					Inorganics							Metals																					
					% Moisture	Calcium/Magnesium Ratio	Silica as SiO2	Exchangeable Sodium Percent	DENSITY	Electrical conductivity (lab)	pH (Lab)	Aluminium	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Zinc	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide
					%	-	mg/kg	%	g/cm3	µS/cm	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					1	0.1	2000	0.1	0.01	1	0.1	50	5	1	2	5	50	5	0.1	2	5	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005
Airservices EISLs (terrestrial) - 95% protection																											3.73					
Airservices EISLs (terrestrial) - com./ind., 60% protection, low reliability																											3.73					
Airservices EISLs (terrestrial) - residential, 80% protection, low reliability																											**3.73**					
GHD 2017 - Airservices HBSC - Commercial/Industrial																										*81* [#1]					
GHD 2017 - Airservices HBSC - Recreational Public Open Space																										6					
Site_ID	**Location_Code**	**Sample_Depth_Range**	**Field_ID**	**Sampled_Date_Time**																													
Sunshine Coast Airport	GW01	0.1-0.2	GW01-0.2	16/11/2016	26.8	-	980,000	-	-	-	-	130	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
		0.4-0.5	GW01-0.5	16/11/2016	-	-	-	-	2.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3-3.1	GW01-3.1	16/11/2016	19.9	0.2	-	12.5	-	16	5.6	-	-	-	-	-	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				16/11/2016	17.8	-	984,000	-	-	-	-	780	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	GW02	0.7-0.8	GW02-0.8	16/11/2016	21.9	0.6	-	6.3	-	27	6.2	-	-	-	-	-	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				16/11/2016	20.1	-	924,000	-	2.67	-	-	2090	<5	<1	3	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
		4.4-4.5	GW02-4.5	16/11/2016	22.6	-	995,000	-	-	-	-	1420	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	GW03	0.1-0.2	GW03-0.2	16/11/2016	6.4	-	946,000	-	-	-	-	270	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
		1.9-2	GW03-2.0	16/11/2016	21	-	-	-	-	-	-	1670	<5	<1	<2	<5	-	<5	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-
		2.9-3	GW03-3.0	16/11/2016	-	-	922,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	GW04	0.9-1	GW04-1.0	16/11/2016	18.9	0.1	-	<0.1	-	11	6.7	-	-	-	-	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				17/11/2016	18.8	-	961,000	-	-	-	-	80	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
		3.9-4	GW04-4.0	17/11/2016	19.5	-	948,000	-	-	-	-	560	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	GW05	0.1-0.2	GW05-0.2	16/11/2016	12	-	824,000	-	-	-	-	3680	<5	<1	11	8	-	5	<0.1	21	23	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
		2.9-3	GW05-3.0	16/11/2016	20.2	-	916,000	-	-	-	-	2240	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	GW06	0.9-1	GW06-1.0	16/11/2016	20.6	-	-	<0.1	-	4	6.2	-	-	-	-	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				17/11/2016	20.4	-	997,000	-	-	-	-	<50	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
		3.9-4	GW06-4.0	17/11/2016	18.6	-	967,000	-	-	-	-	670	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	SS1	0-0.1	SS1	15/11/2016	9.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0013	<0.0002	0.0003	<0.0002	<0.0005	<0.0005
	SS2	0-0.1	SS2	15/11/2016	16.8	3.3	-	2.9	-	46	6.6	-	-	-	-	-	2710	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				15/11/2016	18.5	-	866,000	-	2.6	-	-	4480	<5	<1	6	<5	-	<5	<0.1	2	20	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0105	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	SS3	0-0.1	SS3	17/11/2016	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	0.0006	<0.0005	<0.0002	0.0163	<0.0002	<0.0002	0.0011	0.0043	<0.0005
	SS4	0-0.1	SS4	17/11/2016	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	0.0008	<0.0005
	SS5	0-0.1	SS5	16/11/2016	6.9	-	873,000	-	-	-	-	2440	<5	<1	7	<5	-	6	<0.1	12	18	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
	SS6	0-0.1	SS6	15/11/2016	7.9	-	-	19.1	-	18	5.3	-	-	-	-	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				15/11/2016	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.001	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Statistical Summary																																	
Number of Results					24	4	14	6	3	6	6	14	14	14	14	14	6	14	14	14	14	18	18	18	18	18	18	18	18	18	18	18	18
Number of Detects					24	4	14	4	3	6	6	13	0	0	4	1	3	2	0	3	3	0	0	1	0	0	6	0	1	1	2	0
Minimum Concentration					2	0.1	824000	<0.1	2.6	4	5.3	<50	<5	<1	<2	<5	<50	<5	<0.1	<2	<5	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Minimum Detect					2	0.1	824000	2.9	2.6	4	5.3	80	ND	ND	3	8	60	5	ND	2	18	ND	ND	0.0006	ND	ND	0.0004	ND	0.0003	0.0011	0.0008	ND
Maximum Concentration					26.8	3.3	997000	19.1	2.67	46	6.7	4480	<5	<1	11	8	2710	6	<0.1	21	23	<0.0002	<0.0002	0.0006	<0.0005	<0.0002	0.0163	<0.0002	0.0003	0.0011	0.0043	<0.0005
Maximum Detect					26.8	3.3	997000	19.1	2.67	46	6.7	4480	ND	ND	11	8	2710	6	ND	21	23	ND	ND	0.0006	ND	ND	0.0163	ND	0.0003	0.0011	0.0043	ND
Average Concentration					16	1.1	935929	6.8	2.6	20	6.1	1467	2.5	0.5	2.6	2.9	484	2.9	0.05	3.3	6.3	0.0001	0.0001	0.00027	0.00025	0.0001	0.0017	0.0001	0.00011	0.00016	0.00051	0.00025
Median Concentration					18.7	0.4	947000	4.6	2.67	17	6.2	1100	2.5	0.5	1	2.5	42.5	2.5	0.05	1	2.5	0.0001	0.0001	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.0001	0.00025	0.00025
Standard Deviation					7	1.5	52201	7.6	0.04	15	0.55	1390	0	0	3.1	1.5	1091	1.1	0	5.9	7.7	0	0	0.000082	0	0	0.0044	0	0.000047	0.00024	0.00096	0
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#1:GHD 2017. PFAS Investigation - Derivation of PFAS soil criteria

Table 1. Soil Results

					PFAS																
					N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002
Airservices EISLs (terrestrial) - 95% protection									3.73									0.373						
Airservices EISLs (terrestrial) - com./ind., 60% protection, low reliability									3.73									4.71						
Airservices EISLs (terrestrial) - residential, 80% protection, low reliability									**3.73**									**0.91**						
GHD 2017 - Airservices HBSC - Commercial/Industrial									*680 #1*															
GHD 2017 - Airservices HBSC - Recreational Public Open Space									48															
Site_ID	**Location_Code**	**Sample_Depth_Range**	**Field_ID**	**Sampled_Date_Time**																				
Sunshine Coast Airport	GW01	0.1-0.2	GW01-0.2	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
		0.4-0.5	GW01-0.5	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3-3.1	GW01-3.1	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	GW02	0.7-0.8	GW02-0.8	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
		4.4-4.5	GW02-4.5	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	GW03	0.1-0.2	GW03-0.2	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
		1.9-2	GW03-2.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2.9-3	GW03-3.0	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	GW04	0.9-1	GW04-1.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				17/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
		3.9-4	GW04-4.0	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	GW05	0.1-0.2	GW05-0.2	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
		2.9-3	GW05-3.0	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	GW06	0.9-1	GW06-1.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				17/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
		3.9-4	GW06-4.0	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	SS1	0-0.1	SS1	15/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.0017	0.0017
	SS2	0-0.1	SS2	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				15/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0004	<0.0002	<0.001	0.0004	<0.0002	0.0003	<0.0002	<0.0002	0.0004	0.0105	<0.0002	<0.0005	<0.0002	0.0003	0.0123	0.0109
	SS3	0-0.1	SS3	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0056	<0.0002	<0.001	0.0112	0.0015	0.0034	0.002	0.0017	0.0086	0.0163	0.0003	<0.0005	0.0005	0.0045	0.0616	0.031
	SS4	0-0.1	SS4	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0002	<0.001	0.0006	<0.0002	0.0006	<0.0002	<0.0002	0.0004	0.0004	<0.0002	<0.0005	<0.0002	0.0008	0.0039	0.0015
	SS5	0-0.1	SS5	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0002	<0.0002	0.0006	0.0004
	SS6	0-0.1	SS6	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				15/11/2016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.001	0.001
Statistical Summary																								
Number of Results					18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Number of Detects					0	0	0	0	4	0	0	4	1	3	1	1	3	6	1	0	1	3	6	6
Minimum Concentration					<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Minimum Detect					ND	ND	ND	ND	0.0003	ND	ND	0.0002	0.0015	0.0003	0.002	0.0017	0.0004	0.0004	0.0003	ND	0.0005	0.0003	0.0006	0.0004
Maximum Concentration					<0.0005	<0.0005	<0.0005	<0.0005	0.0056	<0.0002	<0.001	0.0112	0.0015	0.0034	0.002	0.0017	0.0086	0.0163	0.0003	<0.0005	0.0005	0.0045	0.0616	0.031
Maximum Detect					ND	ND	ND	ND	0.0056	ND	ND	0.0112	0.0015	0.0034	0.002	0.0017	0.0086	0.0163	0.0003	ND	0.0005	0.0045	0.0616	0.031
Average Concentration					0.00025	0.00025	0.00025	0.00025	0.00045	0.0001	0.0005	0.00077	0.00018	0.00032	0.00021	0.00019	0.00061	0.0017	0.00011	0.00025	0.00012	0.00039	0.0046	0.0027
Median Concentration					0.00025	0.00025	0.00025	0.00025	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00025	0.0001	0.0001	0.0001	0.0001
Standard Deviation					0	0	0	0	0.0013	0	0	0.0026	0.00033	0.00078	0.00045	0.00038	0.002	0.0044	0.000047	0	0.000094	0.001	0.015	0.0075
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#1:GHD 2017. PFAS Investigation - Derivation of PFAS soil criteria

Table 1. Soil Results

				Particle Sizing												Soil Classification					TOC	Major Ions				Cations						
				+1180um	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm	+600µm EA150H	+150µm EA150H	+300µm EA150H	+425µm EA150H	+75µm EA150H	Cobbles (>6cm)	Gravel (>2mm)	Sand (0.06-2.00 mm)	Clay (<2 µm)	Silt (2-60 µm) EA150H	Total Organic Carbon	Calcium	Magnesium	Potassium	Sodium	Exchangeable Aluminium	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	Exchange Acidity	Magnesium/Potassium Ratio
				%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	-
EQL				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.02	50	50	50	50	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Airservices EISLs (terrestrial) - 95% protection																																
Airservices EISLs (terrestrial) - com./ind., 60% protection, low reliability																																
Airservices EISLs (terrestrial) - residential, 80% protection, low reliability																																
Airservices HBSC - Commercial/Industrial																																
CRC Care 2017 - Commercial Industrial (HSL D)																																
CRC Care 2017 - Commercial and Industrial ESL, 65% Species Protection																																
Location Code	**Sample Depth Range**	**Field ID**	**Date Sampled**																													
GW01	0.1-0.2	GW01-0.2	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.08	-	-	<50	-	-	-	-	-	-	-
	0.4-0.5	GW01-0.5	16/11/2016	<1	<1	<1	<1	<1	<1	<1	<1	97	30	6	99	<1	<1	99	<1	1	-	-	-	-	-	-	-	-	-	-	-	-
	3-3.1	GW01-3.1	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.97	-	-	<50	-	<0.1	0.1	0.6	<0.1	0.1	0.9	-
GW02	0.7-0.8	GW02-0.8	16/11/2016	<1	<1	<1	<1	<1	<1	<1	<1	81	10	2	89	<1	<1	89	8	3	4.24	-	-	<50	-	-	3	4.7	<0.1	0.5	-	-
	4.4-4.5	GW02-4.5	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.86	-	-	50	-	-	-	-	-	-	-	-
GW03	0.1-0.2	GW03-0.2	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.99	-	-	<50	-	-	-	-	-	-	-	-
	1.9-2	GW03-2.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	-	-	-	-
	2.9-3	GW03-3.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.26	-	-	-	-	-	-	-	-	-	-	-
GW04	0.9-1	GW04-1.0	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.29	-	-	<50	-	-	0.1	1	<0.1	<0.1	-	-
	3.9-4	GW04-4.0	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.85	-	-	<50	-	-	-	-	-	-	-	-
GW05	0.1-0.2	GW05-0.2	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.31	-	-	170	-	-	-	-	-	-	-	-
	2.9-3	GW05-3.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.29	-	-	<50	-	-	-	-	-	-	-	-
GW06	0.9-1	GW06-1.0	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	<50	-	-	0.1	<0.1	<0.1	<0.1	-	-
	3.9-4	GW06-4.0	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.78	-	-	<50	-	-	-	-	-	-	-	-
SS1	0-0.1	SS1	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS2	0-0.1	SS2	15/11/2016	<1	<1	<1	<1	<1	<1	<1	5	72	27	12	81	<1	<1	82	8	10	2.17	-	-	170	-	-	4	1.2	0.2	0.2	-	7.1
SS3	0-0.1	SS3	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS4	0-0.1	SS4	17/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS5	0-0.1	SS5	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.44	-	-	120	-	-	-	-	-	-	-	-
SS6	0-0.1	SS6	15/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	-

Env Stds Comments
#1:GHD 2016. PFAS Investigation - Derivation of PFAS soil criteria

Table 1. Soil Results

				Inorganics								Metals																							
				Calcium/Magnesium Ratio	Silica as SiO2	Exchangeable Sodium Percent	CEC	DENSITY	Electrical conductivity (lab)	Moisture	pH (Lab)	Aluminium	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Zinc	PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamidoacetic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	Perfluorobutane sulfonic acid	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol
				-	mg/kg	%	meq/100g	g/cm3	µS/cm	%	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
EQL				0.1	2000	0.1	0.1	0.01	1	1	0.1	50	5	1	2	5	50	5	0.1	2	5	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005
Airservices EISLs (terrestrial) - 95% protection																															3.73			
Airservices EISLs (terrestrial) - com./ind., 60% protection, low reliability																															3.73			
Airservices EISLs (terrestrial) - residential, 80% protection, low reliability																															**3.73**			
Airservices HBSC - Commercial/Industrial																					640[#1]													
CRC Care 2017 - Commercial Industrial (HSL D)																					*81*													
CRC Care 2017 - Commercial and Industrial ESL, 65% Species Protection																																		
Location Code	**Sample Depth Range**	**Field ID**	**Date Sampled**																																
GW01	0.1-0.2	GW01-0.2	16/11/2016	-	980,000	-	-	-	-	26.8	-	130	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	0.4-0.5	GW01-0.5	16/11/2016	-	-	-	-	2.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3-3.1	GW01-3.1	16/11/2016	0.2	984,000	12.5	1.7	-	16	17.8	5.6	780	<5	<1	<2	<5	60	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
GW02	0.7-0.8	GW02-0.8	16/11/2016	0.6	924,000	6.3	8.2	2.67	27	20.1	6.2	2090	<5	<1	3	<5	60	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	4.4-4.5	GW02-4.5	16/11/2016	-	995,000	-	-	-	-	22.6	-	1420	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
GW03	0.1-0.2	GW03-0.2	16/11/2016	-	946,000	-	-	-	-	6.4	-	270	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	1.9-2	GW03-2.0	16/11/2016	-	-	-	-	-	-	21	-	1670	<5	<1	<2	<5	-	<5	<0.1	<2	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.9-3	GW03-3.0	16/11/2016	-	922,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
GW04	0.9-1	GW04-1.0	17/11/2016	0.1	961,000	<0.1	1.1	-	11	18.8	6.7	80	<5	<1	<2	<5	<50	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	3.9-4	GW04-4.0	17/11/2016	-	948,000	-	-	-	-	19.5	-	560	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
GW05	0.1-0.2	GW05-0.2	16/11/2016	-	824,000	-	-	-	-	12	-	3680	<5	<1	11	8	-	5	<0.1	21	23	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	2.9-3	GW05-3.0	16/11/2016	-	916,000	-	-	-	-	20.2	-	2240	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
GW06	0.9-1	GW06-1.0	17/11/2016	-	997,000	<0.1	0.2	-	4	20.4	6.2	<50	<5	<1	<2	<5	<50	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	3.9-4	GW06-4.0	17/11/2016	-	967,000	-	-	-	-	18.6	-	670	<5	<1	<2	<5	-	<5	<0.1	<2	<5	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
SS1	0-0.1	SS1	15/11/2016	-	-	-	-	-	-	9.7	-	-	-	-	-	-	-	-	-	-	-	0.0013	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	<0.0005	<0.0005
SS2	0-0.1	SS2	15/11/2016	3.3	866,000	2.9	5.6	2.6	46	18.5	6.6	4480	<5	<1	6	<5	2710	<5	<0.1	2	20	0.0105	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
SS3	0-0.1	SS3	17/11/2016	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	0.0163	<0.0005	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	0.0043	<0.0005	<0.0005
SS4	0-0.1	SS4	17/11/2016	-	-	-	-	-	-	3.7	-	-	-	-	-	-	-	-	-	-	-	0.0004	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0005	<0.0005
SS5	0-0.1	SS5	16/11/2016	-	873,000	-	-	-	-	6.9	-	2440	<5	<1	7	<5	-	6	<0.1	12	18	0.0004	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
SS6	0-0.1	SS6	15/11/2016	-	-	19.1	0.6	-	18	4.4	5.3	-	-	-	-	-	<50	-	-	-	-	0.001	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005

Env Stds Comments

#1:GHD 2016. PFAS Investigation - Derivation of PFAS soil criteria

Table 1. Soil Results

				PFAS																	
				N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002
Airservices EISLs (terrestrial) - 95% protection							3.73									0.373						
Airservices EISLs (terrestrial) - com./ind., 60% protection, low reliability							3.73									4.71						
Airservices EISLs (terrestrial) - residential, 80% protection, low reliability							**3.73**									**0.91**						
Airservices HBSC - Commercial/Industrial							6400[#1]															
CRC Care 2017 - Commercial Industrial (HSL D)							*680*															
CRC Care 2017 - Commercial and Industrial ESL, 65% Species Protection							38									60						
Location Code	**Sample Depth Range**	**Field ID**	**Date Sampled**																			
GW01	0.1-0.2	GW01-0.2	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	0.4-0.5	GW01-0.5	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3-3.1	GW01-3.1	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
GW02	0.7-0.8	GW02-0.8	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	4.4-4.5	GW02-4.5	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
GW03	0.1-0.2	GW03-0.2	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	1.9-2	GW03-2.0	16/11/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.9-3	GW03-3.0	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
GW04	0.9-1	GW04-1.0	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	3.9-4	GW04-4.0	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
GW05	0.1-0.2	GW05-0.2	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	2.9-3	GW05-3.0	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
GW06	0.9-1	GW06-1.0	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
	3.9-4	GW06-4.0	17/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SS1	0-0.1	SS1	15/11/2016	<0.0005	<0.0005	<0.0005	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.0017	0.0017
SS2	0-0.1	SS2	15/11/2016	<0.0005	<0.0005	<0.0005	0.0004	<0.0002	<0.001	0.0004	<0.0002	0.0003	<0.0002	<0.0002	0.0004	0.0105	<0.0002	<0.0005	<0.0002	0.0003	0.0123	0.0109
SS3	0-0.1	SS3	17/11/2016	<0.0005	<0.0005	<0.0005	0.0056	<0.0002	<0.001	0.0112	0.0015	0.0034	0.002	0.0017	0.0086	0.0163	0.0003	<0.0005	0.0005	0.0045	0.0616	0.031
SS4	0-0.1	SS4	17/11/2016	<0.0005	<0.0005	<0.0005	0.0003	<0.0002	<0.001	0.0006	<0.0002	0.0006	<0.0002	<0.0002	0.0004	0.0004	<0.0002	<0.0005	<0.0002	0.0008	0.0039	0.0015
SS5	0-0.1	SS5	16/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0002	<0.0002	0.0006	0.0004
SS6	0-0.1	SS6	15/11/2016	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.001	<0.0002	<0.0005	<0.0002	<0.0002	0.001	0.001

Env Stds Comments

#1:GHD 2016. PFAS Investigation - Derivation of PFAS soil criteria

Table 2. Groundwater Results

			Field Parameters					Inorganics	PFAS																								
			DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)
			mg/L	µS/cm	pH Units	mV	°C	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL								10	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
Airservices EISLs (toxicity effects on aquatic organisms)																		2900						2900									6.66	
FSANZ - PFAS Drinking water quality guideline														0.07										0.56										
Site_ID	**Location_Code**	**Sampled_Date_Time**																																
Sunshine Coast Airport	GW01	29/11/2016	2.32	155.4	5.13	-105.6	27.7	718	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02
	GW02	29/11/2016	3.35	267.5	5.33	-137.2	24.3	272	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02
	GW03	29/11/2016	3.23	153.4	4.7	7	26.2	130	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02
	GW04	29/11/2016	3.93	179.3	5.73	-126.1	25.7	124	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02
	GW05	29/11/2016	4.77	710	5.05	-29.5	25.8	2080	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02
	GW06	29/11/2016	4.89	92.2	5.25	-80.9	28.4	164	<0.02	<0.02	<0.05	<0.05	<0.02	0.11	<0.02	0.03	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	0.05	0.04	<0.02	0.08	<0.02
Statistical Summary																																		
Number of Results			6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Number of Detects			6	6	6	6	6	6	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	0
Minimum Concentration			2.32	92.2	4.7	-137.2	24.3	124	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02
Minimum Detect			2.32	92.2	4.7	ND	24.3	124	ND	ND	ND	ND	ND	0.11	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	0.05	0.04	ND	0.08	ND
Maximum Concentration			4.89	710	5.73	7	28.4	2080	<0.02	<0.02	<0.05	<0.05	<0.02	0.11	<0.02	0.03	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	0.05	0.04	<0.02	0.08	<0.02
Maximum Detect			4.89	710	5.73	7	28.4	2080	ND	ND	ND	ND	ND	0.11	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	0.05	0.04	ND	0.08	ND
Average Concentration			3.7	260	5.2	-79	26	581	0.01	0.01	0.025	0.025	0.01	0.023	0.01	0.013	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.0092	0.01	0.05	0.01	0.01	0.01	0.017	0.015	0.01	0.018	0.01
Median Concentration			3.64	167.35	5.19	-93.25	26	218	0.01	0.01	0.025	0.025	0.01	0.005	0.01	0.01	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.005	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.005	0.01
Standard Deviation			0.98	228	0.34	57	1.5	768	0	0	0	0	0	0.043	0	0.0082	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0.016	0.012	0	0.031	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix F
Table 2
Groundwater Results

Table 2. Groundwater Results																				
							Alkalinity				Major Ions									
		Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Sulfate as SO4 - Turbidimetric (Filtered)	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance
		µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%
EQL		0.05	0.02	0.02	0.01	0.01	1	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01
Airservices EISLs (toxicity effects on aquatic organisms)																			
FSANZ - PFAS Drinking water quality guideline																			
Site_ID	**Location_Code**	**Sampled_Date_Time**																	
Sunshine Coast Airport	GW01	29/11/2016	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	25	25	7	4	26	8	1.38	3	25	2.02	18.9
	GW02	29/11/2016	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	30	30	<25	3	51	4	2.04	1	60	3.11	20.9
	GW03	29/11/2016	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	2	2	5	3	34	4	1.1	1	24	1.55	16.8
	GW04	29/11/2016	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	56	56	<25	4	21	12	1.71	2	25	2.32	15.2
	GW05	29/11/2016	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	31	31	40	11	186	24	6.7	2	112	7.45	5.29
	GW06	29/11/2016	<0.05	<0.02	<0.02	0.23	0.23	<1	<1	24	24	<5	2	12	2	0.82	2	16	1.01	10.6
Statistical Summary																				
Number of Results		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Number of Detects		0	0	0	1	1	0	0	6	6	3	6	6	6	6	6	6	6	6	6
Minimum Concentration		<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	2	2	<5	2	12	2	0.82	1	16	1.01	5.29	
Minimum Detect		ND	ND	ND	0.23	0.23	ND	ND	2	2	5	2	12	2	0.82	1	16	1.01	5.29	
Maximum Concentration		<0.05	<0.02	<0.02	0.23	0.23	<1	<1	56	56	40	11	186	24	6.7	3	112	7.45	20.9	
Maximum Detect		ND	ND	ND	0.23	0.23	ND	ND	56	56	40	11	186	24	6.7	3	112	7.45	20.9	
Average Concentration		0.025	0.01	0.01	0.043	0.043	0.5	0.5	28	28	13	4.5	55	9	2.3	1.8	44	2.9	15	
Median Concentration		0.025	0.01	0.01	0.005	0.005	0.5	0.5	27.5	27.5	9.75	3.5	30	6	1.545	2	25	2.17	16	
Standard Deviation		0	0	0	0.092	0.092	0	0	17	17	14	3.3	66	8.2	2.2	0.75	37	2.3	5.8	
Number of Guideline Exceedances		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Appendix F
Table 2
Groundwater Results

Table 2. Groundwater Results

		Field Parameters					Inorganics		Alkalinity				Major Ions							
		DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Sulfate as SO4 - Turbidimetric (Filtered)	Total Dissolved Solids (Filtered)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance
		mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%
EQL							1	10	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01
Airservices EISLs (toxicity effects on aquatic organisms)																				
Australian Department of Health - Health Based Guidance Values for PFAS in Drinking Water																				
Location Code	**Date Sampled**																			
GW01	29/11/2016	2.32	155.4	5.13	-105.6	27.7	7	718	<1	<1	25	25	4	26	8	1.38	3	25	2.02	18.9
GW02	29/11/2016	3.35	267.5	5.33	-137.2	24.3	<25	272	<1	<1	30	30	3	51	4	2.04	1	60	3.11	20.9
GW03	29/11/2016	3.23	153.4	4.7	7	26.2	5	130	<1	<1	2	2	3	34	4	1.1	1	24	1.55	16.8
GW04	29/11/2016	3.93	179.3	5.73	-126.1	25.7	<25	124	<1	<1	56	56	4	21	12	1.71	2	25	2.32	15.2
GW05	29/11/2016	4.77	710	5.05	-29.5	25.8	40	2080	<1	<1	31	31	11	186	24	6.7	2	112	7.45	5.29
GW06	29/11/2016	4.89	92.2	5.25	-80.9	28.4	<5	164	<1	<1	24	24	2	12	2	0.82	2	16	1.01	10.6

		PFAS														
		PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamidoacetic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	Perfluorobutane sulfonic acid	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.01	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05
Airservices EISLs (toxicity effects on aquatic organisms)											**2900**					
Australian Department of Health - Health Based Guidance Values for PFAS in Drinking Water		0.07														
Location Code	**Date Sampled**															
GW01	29/11/2016	<0.01	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
GW02	29/11/2016	<0.01	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
GW03	29/11/2016	<0.01	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
GW04	29/11/2016	<0.01	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
GW05	29/11/2016	<0.01	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
GW06	29/11/2016	0.11	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

		PFAS															
		Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01
Airservices EISLs (toxicity effects on aquatic organisms)		**2900**									**6.66**						
Australian Department of Health - Health Based Guidance Values for PFAS in Drinking Water		0.56															
Location Code	**Date Sampled**																
GW01	29/11/2016	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
GW02	29/11/2016	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
GW03	29/11/2016	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
GW04	29/11/2016	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
GW05	29/11/2016	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
GW06	29/11/2016	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	0.05	0.04	<0.02	0.08	<0.02	<0.05	<0.02	<0.02	0.23	0.23

Table 3. Surface Water Results

			Field Parameters					Inorganics		PFAS																										
			DO (mg/L) (Field)	Electrical conductivity (Field)	pH (Field)	Redox (Field)	Temperature (Field)	pH (Lab)	Total Dissolved Solids (Filtered)	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluoroheptane sulfonic acid	10:2 Fluorotelomer sulfonic acid	4:2 Fluorotelomer sulfonic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	PFHxS and PFOS (Sum of Total) - Lab Calc	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid
			mg/L	µS/cm	pH Units	mV	°C	pH Units	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL								0.01	10	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05
Airservices - GHD 2017 Human Health Criteira - FW Fish Consumption															0.0004										0.0029											
Airservices - GHD 2017 Human Health Criteira - MW Fish Consumption															0.001										0.0082											
Airservices EISLs (toxicity effects on aquatic organisms)																			**2900**						**2900**									**6.66**		
FSANZ - PFAS Recreational water quality guideline															*0.7*										*5.6*											
Site_ID	**Location_Code**	**Sampled_Date_Time**																																		
Sunshine Coast Airport	SW01	15/11/2016	4.8	364.1	4.03	71.5	28.1	3.93	177	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05
	SW02	15/11/2016	4.99	423.7	5.76	41.3	29.2	6.13	250	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05
	SW03	15/11/2016	4.75	4574	6.02	47	27.6	6.48	2570	<0.02	<0.02	<0.05	<0.05	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05
	SW04	15/11/2016	4.53	13,329	6.28	45.5	28.4	6.72	7920	<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	<0.12	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12
Statistical Summary																																				
Number of Results			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Number of Detects			4	4	4	4	4	4	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Minimum Concentration			4.53	364.1	4.03	41.3	27.6	3.93	177	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05
Minimum Detect			4.53	364.1	4.03	41.3	27.6	3.93	177	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND
Maximum Concentration			4.99	13329	6.28	71.5	29.2	6.72	7920	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.12	<0.12	<0.12	<0.12	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.12
Maximum Detect			4.99	13329	6.28	71.5	29.2	6.72	7920	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND
Average Concentration			4.8	4673	5.5	51	28	5.8	2729	0.014	0.014	0.025	0.025	0.014	0.024	0.014	0.014	0.014	0.025	0.034	0.034	0.034	0.034	0.025	0.011	0.014	0.05	0.014	0.014	0.014	0.014	0.014	0.014	0.024	0.014	0.034
Median Concentration			4.775	2498.85	5.89	46.25	28.25	6.305	1410	0.01	0.01	0.025	0.025	0.01	0.015	0.01	0.01	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.0075	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.015	0.01	0.025
Standard Deviation			0.19	6098	1	14	0.67	1.3	3635	0.0075	0.0075	0	0	0.0075	0.026	0.0075	0.0075	0.0075	0	0.018	0.018	0.018	0.018	0	0.0095	0.0075	0	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.026	0.0075	0.018
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Appendix F
Table 3
Surface Water Results

Table 3. Surface Water Results																				
							Alkalinity				Major Ions									
			Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Sulfate as SO4 - Turbidimetric (Filtered)	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance
			µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%
EQL			0.02	0.02	0.01	0.01	1	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01
Airservices - GHD 2017 Human Health Criteira - FW Fish Consumption																			
Airservices - GHD 2017 Human Health Criteira - MW Fish Consumptior																			
Airservices EISLs (toxicity effects on aquatic organisms)																			
FSANZ - PFAS Recreational water quality guideline																			
Site_ID	**Location_Code**	**Sampled_Date_Time**																	
Sunshine Coast Airport	SW01	15/11/2016	<0.02	<0.02	<0.01	<0.01	<1	<1	<1	<1	59	9	47	7	2.55	2	37	2.68	-
	SW02	15/11/2016	<0.02	<0.02	<0.01	<0.01	<1	<1	7	7	42	11	81	8	3.3	2	53	3.56	3.86
	SW03	15/11/2016	<0.02	<0.02	0.07	0.07	<1	<1	23	23	218	45	1290	91	41.4	26	747	42.9	1.78
	SW04	15/11/2016	<0.05	<0.05	<0.05	<0.05	<1	<1	35	35	568	113	4420	275	137	78	2280	129	2.91
Statistical Summary																			
Number of Results			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Number of Detects			0	0	1	1	0	0	3	3	4	4	4	4	4	4	4	4	3
Minimum Concentration			<0.02	<0.02	<0.01	<0.01	<1	<1	<1	<1	42	9	47	7	2.55	2	37	2.68	1.78
Minimum Detect			ND	ND	0.07	0.07	ND	ND	7	7	42	9	47	7	2.55	2	37	2.68	1.78
Maximum Concentration			<0.05	<0.05	0.07	0.07	<1	<1	35	35	568	113	4420	275	137	78	2280	129	3.86
Maximum Detect			ND	ND	0.07	0.07	ND	ND	35	35	568	113	4420	275	137	78	2280	129	3.86
Average Concentration			0.014	0.014	0.026	0.026	0.5	0.5	16	16	222	45	1460	95	46	27	779	45	2.9
Median Concentration			0.01	0.01	0.015	0.015	0.5	0.5	15	15	138.5	28	685.5	49.5	22.35	14	400	23.23	2.91
Standard Deviation			0.0075	0.0075	0.031	0.031	0	0	16	16	244	49	2057	126	63	36	1054	59	1
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3. Surface Water Results

		Field Parameters					Inorganics			Alkalinity				Major Ions																		
		DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Sulfate as SO4 - Turbidimetric (Filtered)	pH (Lab)	Total Dissolved Solids (Filtered)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance	PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamidoacetic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	Perfluorobutane sulfonic acid	Perfluoroheptane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide
		mg/L	µS/cm	pH Units	mV	°C	mg/L	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL							1	0.01	10	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01	0.01	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05
Airservices EISLs (toxicity effects on aquatic organisms)																														2900	
Airservices HISLs (consumption of fish)																														0.3	
Australian Government Department of Health - recreational water quality value																						**0.7**									
CRC Care 2017 - HSL freshwater, fish consumption																						0.0004									
CRC Care 2017 - HSL marine waters, fish consumption																						*0.001*									
Location Code	**Date Sampled**																														
SW01	15/11/2016	4.8	364.1	4.03	71.5	28.1	59	3.93	177	<1	<1	<1	<1	9	47	7	2.55	2	37	2.68	-	*<0.01*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
SW02	15/11/2016	4.99	423.7	5.76	41.3	29.2	42	6.13	250	<1	<1	7	7	11	81	8	3.3	2	53	3.56	3.86	*<0.01*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
SW03	15/11/2016	4.75	4574	6.02	47	27.6	218	6.48	2570	<1	<1	23	23	45	1290	91	41.4	26	747	42.9	1.78	*0.06*	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
SW04	15/11/2016	4.53	13,329	6.28	45.5	28.4	568	6.72	7920	<1	<1	35	35	113	4420	275	137	78	2280	129	2.91	*<0.05*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12

Table 3. Surface Water Results

	PFAS																			
	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorodecane sulfonic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01
Airservices EISLs (toxicity effects on aquatic organisms)					2900									6.66						
Airservices HISLs (consumption of fish)				0.0065	0.3									0.00065						
Australian Government Department of Health - recreational water quality value					**5.6**															
CRC Care 2017 - HSL freshwater, fish consumption					0.0029															
CRC Care 2017 - HSL marine waters, fish consumption					*0.0082*															
Location Code	**Date Sampled**																			
SW01	15/11/2016	<0.05	<0.05	<0.05	<0.05	*<0.01*	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
SW02	15/11/2016	<0.05	<0.05	<0.05	<0.05	*<0.01*	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01
SW03	15/11/2016	<0.05	<0.05	<0.05	<0.05	*0.01*	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	0.07	0.07
SW04	15/11/2016	<0.12	<0.12	<0.12	<0.05	*<0.05*	<0.05	<0.1	<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

Appendix [F]
Table [4]
[Soil QAQC Results]

Table 4. Soil QAQC Results

SDG		ALSE-Brisbane 18-Nov-16	ALSE-Brisbane 18-Nov-16		ALSE-Brisbane 18-Nov-16	ALSE-Brisbane 18-Nov-16		ALSE-Brisbane 18-Nov-16	21-Nov-16	
Field ID		SS1	QA-01	**RPD**	GW06-1.0	QA-05	**RPD**	GW02-0.8	QA_04	**RPD**
Sampled Date/Time		15/11/2016 16:39	15/11/2016 16:39		17/11/2016 15:00	17/11/2016 15:00		16/11/2016 15:00	16/11/2016 15:00	
Chem_Group	**ChemName**	**Units**	**EQL**							
Inorganics	Moisture	%	1	9.7	11.8	20	20.4	20.5	0			
PFAS	PFHxS and PFOS (Sum of Total) - Lab Calc	mg/kg	0.0002	0.0013	0.0011	17	<0.0002	<0.0002	0			
	4:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	10:2 Fluorotelomer sulfonic acid	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0			
	N-Ethyl perfluorooctane sulfonamidoacetic acid	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0			
	N-Methyl perfluorooctane sulfonamidoacetic acid	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0			
	Perfluorobutane sulfonic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluoroheptane sulfonic acid	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0			
	Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002 : 0.005 (Interlab)	0.0003	0.0003	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluoropentanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	8:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	N-Ethyl perfluorooctane sulfonamide	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
	N-Ethyl perfluorooctane sulfonamidoethanol	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0			
	N-Methyl perfluorooctane sulfonamide	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
	N-Methyl perfluorooctane sulfonamidoethanol	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0			
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
	Perfluorooctanoic acid (PFOA)	mg/kg	0.0002 : 0.005 (Interlab)	0.0004	0.0004	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluoropentane sulfonic acid	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0			
	Perfluorobutanoic acid	mg/kg	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.005	0
	Perfluorodecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluorodecane sulfonic acid	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0			
	Perfluorododecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluoroheptanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluorononanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002 : 0.005 (Interlab)	0.001	0.0008	22	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
	Perfluorotetradecanoic acid	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	Perfluorotridecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	Perfluoroundecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFAS (Sum of Total)	mg/kg	0.0002	0.0017	0.0015	13	<0.0002	<0.0002	0			
	PFAS (Sum of Total)(WA DER List)	mg/kg	0.0002	0.0017	0.0015	13	<0.0002	<0.0002	0			

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

Appendix [F]
Table [5]
[Water QAQC Results]

Table 5. Water QAQC Results

SDG		ALSE-Brisbane 18-Nov-16	ALSE-Brisbane 18-Nov-16		ALSE-Brisbane 30-Nov-16	ALSE-Brisbane 30-Nov-16		ALSE-Brisbane 30-Nov-16	1-Dec-16	
Field ID		SW04	QA-03	**RPD**	GW06	QA-01	**RPD**	GW06	QA_02	**RPD**
Sampled Date/Time		15/11/2016 16:39	15/11/2016 16:39		29/11/2016	29/11/2016		29/11/2016	29/11/2016	
Chem_Gro	**ChemName**	**Units**	**EQL**									
PFAS	PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L	0.01	<0.05	<0.05	0	0.11	0.1	10	0.11		
	4:2 Fluorotelomer sulfonic acid	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.01	0
	10:2 Fluorotelomer sulfonic acid	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05		
	N-Ethyl perfluorooctane sulfonamidoacetic acid	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02		
	N-Methyl perfluorooctane sulfonamidoacetic acid	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02		
	Perfluorobutane sulfonic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	<0.01	0
	Perfluoroheptane sulfonic acid	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02		
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	0.03	0.03	0	0.03	0.03	0
	Perfluoropentanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	0.07	111
	8:2 Fluorotelomer sulfonic acid	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.01	0
	N-Ethyl perfluorooctane sulfonamide	µg/L	0.05	<0.12	<0.12	0	<0.05	<0.05	0	<0.05	<0.05	0
	N-Ethyl perfluorooctane sulfonamidoethanol	µg/L	0.05	<0.12	<0.12	0	<0.05	<0.05	0	<0.05		
	N-Methyl perfluorooctane sulfonamide	µg/L	0.05	<0.12	<0.12	0	<0.05	<0.05	0	<0.05	<0.05	0
	N-Methyl perfluorooctane sulfonamidoethanol	µg/L	0.05	<0.12	<0.12	0	<0.05	<0.05	0	<0.05		
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.05	<0.05	0	0.03	0.05	50	0.03	0.09	100
	Perfluoropentane sulfonic acid	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02		
	Perfluorobutanoic acid	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	0.11	10
	Perfluorodecanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	0.02	0
	Perfluorodecane sulfonic acid	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02		
	Perfluorododecanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	<0.01	0
	Perfluoroheptanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	0.05	0.04	22	0.05	0.06	18
	Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	0.04	0.04	0	0.04	0.08	67
	Perfluorononanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	0.03	40
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.05	<0.05	0	0.08	0.07	13	**0.08**	**0.2**	**86**
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.05 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
	Perfluorotetradecanoic acid	µg/L	0.05 : 0.01 (Interlab)	<0.12	<0.12	0	<0.05	<0.05	0	<0.05	<0.01	0
	Perfluorotridecanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	<0.01	0
	Perfluoroundecanoic acid	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	<0.02	<0.02	0	<0.02	<0.01	0
	PFAS (Sum of Total)	µg/L	0.01	<0.05	<0.05	0	0.23	0.23	0	0.23		
	PFAS (Sum of Total)(WA DER List)	µg/L	0.01	<0.05	<0.05	0	0.23	0.23	0	0.23		

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

Appendix G – QA/QC

G. Data quality objectives and quality assurance / quality control

G.1 Data quality objectives

The data quality objectives (DQOs) and investigation strategy have been developed using the methodology discussed in NEPM Schedule B (2) *Guideline on Data Collection, Sample Design and Reporting.* The guideline nominates the implementation of the DQO process in Section 5 of AS4482.1-2005. The purpose of the DQO process is to ensure that the data collection activities are focused on collecting the information needed to make decisions, and answering the relevant questions leading up to such decisions.

The Data Quality Objectives (DQOs) establish a framework for contamination investigations which incorporates a seven stepped continuum that defines the problem at the site. A series of stages then optimises the design of the investigation. These are summarised in the Table G-1 below.

Table G-1 Data quality objectives

Step		Description
1	**State the problem to be resolved**	What is the likelihood that PFAS contamination has migrated off-site via groundwater or surface water?
2	**Identify the decision/s to be made**	To address the problem set out in Step 1, the following decisions are required to achieve the task objective and to identify data gaps and additional information that may be required: • What are the potential sources of PFAS contamination at the site? • Do the concentrations of PFAS in the samples collected exceed adopted guideline criteria? • Do the results of the groundwater, surface water and soil sampling and analysis indicate there is a potential for off-site PFAS which has originated from the Maroochydore (Sunshine Coast) Airport?
3	**Identify the inputs to the decision**	To inform the decisions and identify key data gaps and needs, the following information is considered necessary: • The location of potential PFAS contamination sources. • The location of existing groundwater monitoring wells with respect to potential PFAS contamination sources. • Groundwater and surface water flow pathways. • The results of the laboratory analysis of groundwater samples. • The capacity of the aquifer to attenuate migration.
4	**Define the boundaries of the study**	The study boundary comprises groundwater within the upper (unconfined) aquifer and soil and surface water within the on-site areas in the vicinity of the identified potential PFAS sources as shown in Figure 1. Off-site assessment is not proposed.
5	**Develop a decision rule**	The key decision rules are: Are PFASs present at concentrations above laboratory level of reporting (LOR) in boundary wells, soil and in surface water? • If NO – there is less potential for PFAS contamination to migrate off-site and the priority for conducting off-site groundwater investigations may be reduced. • If YES – there is potential for PFAS contamination to migrate off-site and the priority for conducting off-site groundwater investigations is increased. AND:

Step		Description
		Do the concentrations of PFASs in on-site samples exceed the adopted guideline criteria? • If YES – groundwater and surface water off-site is more likely to be contaminated and the priority for conducting off-site groundwater investigations is increased. • If NO – groundwater and surface water *off-site* is less likely to be contaminated and the priority for conducting off-site groundwater investigations may be reduced.
6	**Specify the tolerable limits on decision errors**	A detailed assessment of potential for sampling and measurement errors will be undertaken based on investigation scope, methodology and results. Data quality will be assessed as detailed in Schedules B2 and B3 of the ASC NEPM. Implications for data quality with respect to the task objective will be identified and discussed. Due to the margin of error associated with analytical methods, any results close to the threshold (within the margin of error either over or under) are more likely to be incorrectly considered either "contaminated" or "uncontaminated". As targeted samples are to be collected as part of a judgemental approach, greater confidence in results will be achieved through knowledge of the site and the likely location of PFAS sources. As such, the following tolerable limits on decision making are proposed for targeted sampling locations: • For results *within* the margin of error (either above or below the threshold) the initial classification would be considered valid (unless for a chemical not considered to be a contaminant of potential concern). • Any results *above* the threshold would require further investigation and delineation to determine the size of the impact identified.
7	**Optimise the design for obtaining the data**	The sample design was optimised through: • Identification of potential PFAS sources from existing information and investigations conducted by others. • A preliminary and high level review of the likely hydraulic characteristics of the upper aquifer to estimate the groundwater flow direction and seepage velocities at various locations of the site. • A review of the surface water pathways across and leaving the site. • Installation of targeted monitoring wells. • Collection of surface water samples. • Collection of soil samples from potentially impacted areas. Soils may have the potential to runoff into surface water drains in periods of high rainfall or inundation. • Appropriate laboratory analysis methodologies. • Evaluation and interpretation of results with respect to relevant guidelines.

G.2 Field QA/QC

A series of QA/QC procedures were implemented for the field investigation works, which included:

- Collection of QC Samples
- Use of standard sampling procedures
- Use of standard field sampling forms, including Chain of Custodies (COCs)
- Documenting the calibration and use of field equipment.

All field works were conducted by a GHD environmental scientist in accordance with GHD's *Standard Field Operating Procedures* (SFOP).

G.2.1 QA/QC sampling

Field QA/QC samples were collected and analysed. Field QC sampling was conducted in reference to AS 4482.1: 2005 and NEPM 2013 Schedule B (3) requirements and included the analyses of the following types of samples in Table G-2.

Table G-2 Field QA/QC sample details

Field QA/QC sample type	Details
Intra-Laboratory Duplicate (Blind)	Comprise a single sample that is divided into two separate sampling containers. Both samples are sent anonymously to the primary project laboratory. Blind duplicates provide an indication of the analytical precision of the laboratory, but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.
Inter-Laboratory Duplicate (Split)	Inter-Laboratory Duplicate (Split) samples are two separate samples collected at the same location and analysed by two separate laboratories to determine the analytical proficiency of the primary laboratory.

GHD adopts the AS4482.1 acceptance criteria of 30% and 50% RPD for field duplicates of inorganics and organics, respectively. Blind duplicate and split samples should have RPDs less than the criteria in each instance. However, it is noted that the criteria will not always be achieved, particularly in heterogeneous materials, or at low analyte concentrations.

In the instance where samples and their corresponding duplicates have concentrations of target analytes less than the laboratory LOR, no quantitative comparison can be carried out and therefore the RPD is undefined. This is also the case for situations where the sample result is less than ten times the laboratory LOR.

Duplicate and split sample results and Relative Percentage Difference (RPD) calculations are presented in Appendix F.

G.2.2 Sample handling and preservation

All soil samples were collected by hand, using single use nitrile gloves between each sample, and placed directly into pre-treated laboratory supplied jars and bags. The samples were placed immediately into a chilled esky for storage while on site and upon completion of site works the sealed esky was delivered, via courier, to the laboratory.

Groundwater samples were collected using disposable equipment and transferred to the laboratory-supplied applicable sample bottles. Surface water samples were collected using laboratory supplied applicable sample bottles. Samples were placed directly into the chilled esky and delivered upon return from site to the laboratory.

All samples were received intact as per the Sample Receipt Notification (included in Appendix H).

G.2.3 Holding Times

Most of the samples were analysed within the laboratory recommended holding times, except for the pH and TDS of surface water samples, where pH was overdue by 7 days, and TDS by 2 days. This is due to the short holding times of the analyte.

G.2.3 Chain of custody

Unique Chain of Custody documentation and distinct batch numbers accompany all sample batches. This documentation is included in Appendix H.

G.3 Laboratory QA/QC

The laboratories subcontracted by GHD to analyse samples (ALS and Eurofins MGT) are certified by the NATA for the required analysis. NATA certification provides for laboratory QA procedures to be in place and to be carried out on an on-going basis.

As part of the NATA requirements, the laboratories carried out and reported analysis of laboratory quality control samples, such as:

- Duplicate samples (the same sample analysed more than once)
- Blanks (containing none of the analytes to be analysed)
- Spiked samples (containing known additions of the analytes to appropriate matrices)
- Standard samples (samples containing known concentrations of the analytes - also known as reference standards).

G.3.1 Laboratory QA/QC procedures

As part of NATA requirements, the laboratories incorporated a range of QA methods to ensure accuracy of data. This includes the analyses of internal laboratory QC samples, details of which have been provided in Table G-3.

Table G-3 Laboratory QC sample details

Laboratory QA/QC sample	Details
Laboratory (Method) Blank	Usually an organic or aqueous solution that is as free as possible of analytes of interest to which is added all the reagents, in the same volume, as used in the preparation and subsequent analysis of the samples. The reagent blank is carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample.
Laboratory Control Sample	A reference standard of known concentration is analysed along with a batch of samples. The Laboratory Control Sample provides an indication of the analytical accuracy and the precision of the test method and is used for inorganic analyses.
Laboratory Spike	An authentic field sample is 'spiked' by adding an aliquot of known concentration of the target analyte(s) prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques. Spiked samples will be analysed for each batch where samples are analysed for organic chemicals of concern.
Surrogate Samples	These are organic compounds which are similar to the analyte of interest in terms of chemical composition, extractability, and chromatographic conditions (retention time), but which are not normally found in environmental samples. These surrogate compounds are 'spiked' into blanks, standards and samples submitted for organic analyses by gas-chromatographic techniques prior to sample extraction. Surrogate Standard / Spikes provide a means of checking that no gross errors have occurred during any stage of the test method leading to significant analyte loss.

Laboratory QA/QC sample	Details
Laboratory Duplicates	The analytical laboratory collects duplicate sub samples from one sample submitted for analytical testing at a rate equivalent to one in twenty samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch. A laboratory duplicate provides data on the analytical precision and reproducibility of the test result. The precision of analysis performed by the laboratory is determined by the calculation of the relative percent difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample material with results representing the percent difference between the two sample concentrations for a specific contaminant. The RPD is calculated using the following formula: $RPD(\%) = \frac{\lvert C_o - C_d \rvert}{C_o + C_d} \times 200$ Where Co = Analyte concentration of the original sample Cd = Analyte concentration of the duplicate sample

The laboratory is required to provide this information to GHD. The individual analytical laboratories conduct an assessment of the laboratory QC program internally; however, the results are also reviewed and assessed by GHD.

G.4 Field QC results

The field QC results discussion below considered all the soil, groundwater and surface water samples collected as part of the investigation stage for the SCA site.

G.4.1 Soil

A total of 38 soil samples were collected and 20 were analysed during the site sampling program. Three soil QC samples (including two intra-laboratory and one inter-laboratory samples) were collected and analysed as part of the field work program. The target frequency for collection and analysis of field QC samples is 1 in 20 (5%). In this instance, this frequency was achieved for analysis (8%) and collection (15%).

RPDs were calculated between the duplicate results. Field QC samples collected are provided in the Table G-4.

Table G-4 Analysed field QC samples for soil

QA sample ID	QA/QC sample	Primary sample
QA-01	Intra-laboratory	SS1
QA-04	Intra-laboratory	GW06-1.0
QA-05	Inter-laboratory	GW02-0.8

All RPD results were within the adopted data quality objectives.

G.4.2 Groundwater/surface water

A total of 10 water samples (groundwater and surface water) were submitted as part of the groundwater and surface water investigations at the SCA.

Two field duplicate (intra-laboratory) and two split (inter-laboratory) samples were collected and analysed as part of the investigation. The target frequency for analysis of field QC samples is 1 in 20 (5%). In this instance, this frequency was achieved for analysis (30%).

The field QC sample collected are provided in the Table G-6.

Table G-5 Analysed field QC samples for groundwater/surface water

QA sample	QA/QC sample	Primary sample
QA-01	Intra-laboratory	GW06
QA-02	Inter-laboratory	GW06
QA-03	Intra-laboratory	SW04

Table G-6 RPD results outside of data quality limits

Primary & QA Pair	Analyte	Primary (µg/L)	QA/QC (µg/L)	RPD (%)
GW06 & QA-02	PFOS	0.08	0.2	86

The primary and secondary laboratory results of the PFAS had different LORs, which could be due to the different methods and analytical equipment used for the analysis at both laboratories. As most PFAS results RPD are within the acceptable limits and both set of results were less than adopted criteria, the results are considered to be valid for this assessment.

G.5 Laboratory program

The NATA certified laboratories utilised for this assessment (ALS and Eurofins MGT) undertook their own internal quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are provided in Appendix H.

All of the internal laboratory QA QC analysis, including method blanks, control samples, laboratory spikes and surrogates spikes was within the data quality criteria, no outlier was reported for the internal laboratory QA QC reports.

G.6 Overall assessment of data quality

With the exception of the non-conformances listed above, the majority of the GHD QA/QC parameters were within the specified requirements, therefore the data is considered to be valid and of sufficient quality for the purposes of this Preliminary Sampling report.

Appendix H – Laboratory Reports

CHAIN OF CUSTODY

ALS Environmental — ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Wombrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
ORANGE 4/13 Geary Place North Orange NSW 2800 Ph: 02 6393 2063 E: orange@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 F: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: perthsample@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS: ☑ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact	Yes / No / N/A
PROJECT: Sunshine Coast Airport PSI	ALS QUOTE NO.:	Preservation Confirmed (where applicable)	Yes / No / N/A
ORDER NUMBER: 3134249	COC SEQUENCE NUMBER (Circle) COC: (1) 2 3 4 5 6 7	Random Sample Temperature on Receipt	
PROJECT MANAGER: Therese Hammond CONTACT PH: 0481715953	OF: 1 2 (3) 4 5 6 7	Other Comments:	

SAMPLER: Bernice Ng	SAMPLER MOBILE: 0437 500 717	RELINQUISHED BY: B. NG	RECEIVED BY: Jodie	RELINQUISHED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat	DATE/TIME: 18/11/16	DATE/TIME: 18/11/16 13:25	DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed): ~~Adam.Lupton@ghd.com~~; Bernice.Ng@ghd.com				RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed): ~~Adam.Lupton@ghd.com~~; Bernice.Ng@ghd.com				DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Therese.Hammond@ghd.com

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	TOC	8 metals K, Al, Si	PFAS (Full Extended suite)	PSD + (% Clay)	Major ion	Alkalinity	TDS	pH		Comments on likely contaminant levels, dilutions, samples requiring specific QC analysis
1	SW01	15/11/16	W					✓		✓	✓	✓	✓		
2	SW02	"	W					✓		✓	✓	✓	✓		
3	SW03	"	W					✓		✓	✓	✓	✓		
4	SW04	"	W					✓		✓	✓	✓	✓		
5	QA-02	"	W					✓							Forward to Eurofins MGT
5	QA-03	"	W					✓							
6	SS1	"	S					✓							
7	SS2	"	S			✓	✓	✓	✓						
8	SS6	"	S					✓							
9	QA-01	"	S					✓							
10	SS5	16/11/16	S			✓	✓	✓							
11	SS3	17/11/16	S					✓							
12	SS4	17/11/16	S					✓							
13	GW01-0.0	16/11/16	S												
14	GW01-0.2	"	S			✓	✓	✓							
15	GW01-0.5	"	S						✓						
16	GW01-1.0	"	S												
17	GW01-3.1	"	S			✓	✓	✓							
18	GW02-0.0	"	S												
19	GW02-0.2	"	S												
20	GW02-0.5	"	S												
21	GW02-0.8	"	S			✓	✓	✓	✓						
22	GW02-2.0	"	S												
23	GW02-3.0	"	S												
24	GW02-4.5	"	S			✓	✓	✓							
				TOTAL											

* 8 metals (Standard ALS 8 metals suite)

Environmental Division
Brisbane
Work Order Reference
EB1627495

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 Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: Brisbane

PROJECT: Sunshine Coast Airport PSI

ORDER NUMBER: 313424900

PROJECT MANAGER: Therese Hammond

CONTACT PH:

SAMPLER: Bernice Ng

SAMPLER MOBILE: 0437 500 717

COC emailed to ALS? (YES / NO)

EDD FORMAT (or default): Esdat

Email Reports to (will default to PM if no other addresses are listed): Adam.Lupton@ghd.com ; Bernice.Ng@ghd.com

Email Invoice to (will default to PM if no other addresses are listed): Adam.Lupton@ghd.com ; Bernice.Ng@ghd.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.:

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:

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
	9odu		
DATE/TIME:	DATE/TIME: 18/11/16 13:25	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) [illegible]ved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TOC	8 Metals, K, Al, Si	PFAS (Full Extended Suite)	PSD (% Clay)	Major ion	Alkalinity	TDS	pH	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
[redacted]	QA-04	16/11/16	S					✓						Forward to Eurofins MGT.
25 [redacted]	GW03-0.0	"	S											
26 [redacted]	GW03-0.2	"	S			✓	✓	✓						
27 [redacted]	GW03-0.5	"	S											
28 [redacted]	GW03-2.0	"	S											
29 [redacted]	GW03-3.0	"	S			✓	✓	✓						
30 [redacted]	GW03-3.5	"	S											
31 [redacted]	GW05-0.0	"	S											
32 [redacted]	GW05-0.2	"	S			✓	✓	✓						
33 [redacted]	GW05-0.5	"	S											
34 [redacted]	GW05-1.0	"	S											
35 [redacted]	GW05-3.0	"	S			✓	✓	✓						
36 [redacted]	GW05-3.5	"	S											
37 [redacted]	GW05-4.0	"	S											
38 [redacted]	GW04-0.0	17/11/16	S											
39 [redacted]	GW04-0.2	"	S											
40 [redacted]	GW04-0.5	"	S											
41 [redacted]	GW04-1.0	"	S			✓	✓	✓						
42 [redacted]	GW04-3.0	"	S											
43 [redacted]	GW04-4.0	"	S			✓	✓	✓						
44 [redacted]	GW06-0.0	"	S											
45 [redacted]	GW06-0.2	"	S											
46 [redacted]	GW06-0.5	"	S											
47 [redacted]	GW06-1.0	"	S			✓	✓	✓						
48 [redacted]	GW06-2.0	"	S											
				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
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☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
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☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: Brisbane

PROJECT:

ORDER NUMBER:

PROJECT MANAGER: CONTACT PH:

SAMPLER: Bernice Ng SAMPLER MOBILE: 0437 500 717

COC emailed to ALS? (YES / NO) EDD FORMAT (or default): Esdat

Email Reports to (will default to PM if no other addresses are listed): Adam.Lupton@ghd.com ; Bernice.Ng@ghd.com

Email Invoice to (will default to PM if no other addresses are listed): Adam.Lupton@ghd.com ; Bernice.Ng@ghd.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.:

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:
	Goodwin		
DATE/TIME:	DATE/TIME: 18/11/16 13:25	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	TOC	8 metals, K, Al, Si	PFAS Full Ext. Suite	Major ions	Alkalinity	TDS	pH		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
49 ~~80~~	GW06-3.0	17/11/16	S											
50 ~~81~~	GW06-4.0	"	"			✓	✓	✓						
51 ~~82~~	QA-05	"	S					✓						
				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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1627495**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: therese.hammond@ghd.com	E-mail	: Vanessa.Turnbull@alsglobal.com
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Facsimile	: +61 03 8687 8111	Facsimile	: +61-7-3243 7218
Project	: Sunshine Coast Airport PSI	Page	: 1 of 4
Order number	: 3134249	Quote number	: ES2015GHDSER0820 (EN/005/15)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BERNICE NG		

Dates

Date Samples Received	: 18-Nov-2016 1:25 PM	Issue Date	: 22-Nov-2016
Client Requested Due Date	: 28-Nov-2016	Scheduled Reporting Date	: **28-Nov-2016**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 4	Temperature	: 1.8°C, 1.5°C, 2.8°C, 0.6°C - Ice present
Receipt Detail	: MEDIUM ESKIES	No. of samples received / analysed	: 50 / 27

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
- **22/11/16: SRN has been resent to acknowledge remove the major cations, total mercury, total metals from GW03-3.0 and request the major cations, total mercury and total metals to be analysed on GW03-2.0. For any further information regarding these adjustments please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- **Please be advised that sample "GW05-3.5" was not received at the laboratory (denoted SNR on the scanned COC).**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- **Silica analysis will be conducted by ALS Minerals, Brisbane, NATA accreditation no. 825, Site No. 818.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- 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.**

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 to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - ED093T Cations - Total	SOIL - EP231X PFAS - Full Suite (28 analytes)
EB1627495-006	[15-Nov-2016]	SS1	✓		✓
EB1627495-007	[15-Nov-2016]	SS2	✓	✓	✓
EB1627495-008	[15-Nov-2016]	SS6	✓		✓
EB1627495-009	[15-Nov-2016]	QA-01	✓		✓
EB1627495-010	[16-Nov-2016]	SS5	✓	✓	✓
EB1627495-011	[17-Nov-2016]	SS3	✓		✓
EB1627495-012	[17-Nov-2016]	SS4	✓		✓
EB1627495-014	[16-Nov-2016]	GW01-0.2	✓	✓	✓
EB1627495-017	[16-Nov-2016]	GW01-3.1	✓	✓	✓
EB1627495-021	[16-Nov-2016]	GW02-0.8	✓	✓	✓
EB1627495-024	[16-Nov-2016]	GW02-4.5	✓	✓	✓
EB1627495-026	[16-Nov-2016]	GW03-0.2	✓	✓	✓
EB1627495-028	[16-Nov-2016]	GW03-2.0	✓		
EB1627495-029	[16-Nov-2016]	GW03-3.0	✓		✓
EB1627495-032	[16-Nov-2016]	GW05-0.2	✓	✓	✓
EB1627495-035	[16-Nov-2016]	GW05-3.0	✓	✓	✓
EB1627495-041	[17-Nov-2016]	GW04-1.0	✓	✓	✓
EB1627495-043	[17-Nov-2016]	GW04-4.0	✓	✓	✓
EB1627495-047	[17-Nov-2016]	GW06-1.0	✓	✓	✓
EB1627495-050	[17-Nov-2016]	GW06-4.0	✓	✓	✓
EB1627495-051	[17-Nov-2016]	QA-05	✓		✓

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA150H/EA152 Particle Sizing with Hydrometer + Soil Particle	SOIL - EG005T (solids) Total Metals by ICP-AES	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - ME-ICP81x (Subcontracted) Sodium Peroxide fusion - ICPAES finish	SOIL - NT-1T Total Major Cations (Ca, Mg, Na, K)	SOIL - S-02 8 Metals (incl. Digestion)
EB1627495-007	[15-Nov-2016]	SS2		✓	✓	✓	✓		✓
EB1627495-010	[16-Nov-2016]	SS5			✓	✓	✓		✓
EB1627495-013	[16-Nov-2016]	GW01-0.0	✓						
EB1627495-014	[16-Nov-2016]	GW01-0.2			✓	✓	✓		✓
EB1627495-015	[16-Nov-2016]	GW01-0.5		✓					
EB1627495-016	[16-Nov-2016]	GW01-1.0	✓						
EB1627495-017	[16-Nov-2016]	GW01-3.1			✓	✓	✓		✓
EB1627495-018	[16-Nov-2016]	GW02-0.0	✓						
EB1627495-019	[16-Nov-2016]	GW02-0.2	✓						
EB1627495-020	[16-Nov-2016]	GW02-0.5	✓						
EB1627495-021	[16-Nov-2016]	GW02-0.8		✓	✓	✓	✓		✓
EB1627495-022	[16-Nov-2016]	GW02-2.0	✓						
EB1627495-023	[16-Nov-2016]	GW02-3.0	✓						
EB1627495-024	[16-Nov-2016]	GW02-4.5			✓	✓	✓		✓
EB1627495-025	[16-Nov-2016]	GW03-0.0	✓						
EB1627495-026	[16-Nov-2016]	GW03-0.2			✓	✓	✓		✓
EB1627495-027	[16-Nov-2016]	GW03-0.5	✓						
EB1627495-028	[16-Nov-2016]	GW03-2.0			✓			✓	✓
EB1627495-029	[16-Nov-2016]	GW03-3.0				✓	✓		
EB1627495-030	[16-Nov-2016]	GW03-3.5	✓						
EB1627495-031	[16-Nov-2016]	GW05-0.0	✓						
EB1627495-032	[16-Nov-2016]	GW05-0.2			✓	✓	✓		✓
EB1627495-033	[16-Nov-2016]	GW05-0.5	✓						
EB1627495-034	[16-Nov-2016]	GW05-1.0	✓						
EB1627495-035	[16-Nov-2016]	GW05-3.0			✓	✓	✓		✓
EB1627495-037	[16-Nov-2016]	GW05-4.0	✓						
EB1627495-038	[17-Nov-2016]	GW04-0.0	✓						
EB1627495-039	[17-Nov-2016]	GW04-0.2	✓						
EB1627495-040	[17-Nov-2016]	GW04-0.5	✓						
EB1627495-041	[17-Nov-2016]	GW04-1.0			✓	✓	✓		✓
EB1627495-042	[17-Nov-2016]	GW04-3.0	✓						
EB1627495-043	[17-Nov-2016]	GW04-4.0			✓	✓	✓		✓
EB1627495-044	[17-Nov-2016]	GW06-0.0	✓						
EB1627495-045	[17-Nov-2016]	GW06-0.2	✓						
EB1627495-046	[17-Nov-2016]	GW06-0.5	✓						
EB1627495-047	[17-Nov-2016]	GW06-1.0			✓	✓	✓		✓
EB1627495-048	[17-Nov-2016]	GW06-2.0	✓						
EB1627495-049	[17-Nov-2016]	GW06-3.0	✓						
EB1627495-050	[17-Nov-2016]	GW06-4.0			✓	✓	✓		✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA005P pH (PC)	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EB1627495-001	[15-Nov-2016]	SW01	✓	✓	✓	✓
EB1627495-002	[15-Nov-2016]	SW02	✓	✓	✓	✓
EB1627495-003	[15-Nov-2016]	SW03	✓	✓	✓	✓
EB1627495-004	[15-Nov-2016]	SW04	✓	✓	✓	✓
EB1627495-005	[15-Nov-2016]	QA-03			✓	

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 Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
SW01	Clear Plastic Bottle - Natural	----	15-Nov-2016	18-Nov-2016	×	----	----
SW02	Clear Plastic Bottle - Natural	----	15-Nov-2016	18-Nov-2016	×	----	----
SW03	Clear Plastic Bottle - Natural	----	15-Nov-2016	18-Nov-2016	×	----	----
SW04	Clear Plastic Bottle - Natural	----	15-Nov-2016	18-Nov-2016	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

BERNICE NG

- *AU Certificate of Analysis - NATA (COA)	Email	bernice.ng@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bernice.ng@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bernice.ng@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bernice.ng@ghd.com
- A4 - AU Tax Invoice (INV)	Email	bernice.ng@ghd.com
- Attachment - Report (SUBCO)	Email	bernice.ng@ghd.com
- Chain of Custody (CoC) (COC)	Email	bernice.ng@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	bernice.ng@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	bernice.ng@ghd.com
- EDI Format - XTab (XTAB)	Email	bernice.ng@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	bernice.ng@ghd.com

THERESE HAMMOND

- *AU Certificate of Analysis - NATA (COA)	Email	therese.hammond@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	therese.hammond@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	therese.hammond@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	therese.hammond@ghd.com
- A4 - AU Tax Invoice (INV)	Email	therese.hammond@ghd.com
- Attachment - Report (SUBCO)	Email	therese.hammond@ghd.com
- Chain of Custody (CoC) (COC)	Email	therese.hammond@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	therese.hammond@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	therese.hammond@ghd.com
- EDI Format - XTab (XTAB)	Email	therese.hammond@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	therese.hammond@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1627495**	Page	: 1 of 21
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Project	: Sunshine Coast Airport PSI	Date Samples Received	: 18-Nov-2016 13:25
Order number	: 3134249	Date Analysis Commenced	: 21-Nov-2016
C-O-C number	: ----	Issue Date	: 29-Nov-2016 20:40
Sampler	: BERNICE NG		
Site	: ----		
Quote number	: ----		
No. of samples received	: 50		
No. of samples analysed	: 27		

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*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils, 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: Particular samples required dilution prior to extraction due to matrix interferences. LOR values have been adjusted accordingly.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS1	SS2	SS6	QA-01	SS5
			Client sampling date / time	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-006	EB1627495-007	EB1627495-008	EB1627495-009	EB1627495-010
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	9.7	18.5	4.4	11.8	6.9
EA150: Particle Sizing								
+75µm	----	1	%	----	81	----	----	----
+150µm	----	1	%	----	72	----	----	----
+300µm	----	1	%	----	27	----	----	----
+425µm	----	1	%	----	12	----	----	----
+600µm	----	1	%	----	5	----	----	----
+1180µm	----	1	%	----	<1	----	----	----
+2.36mm	----	1	%	----	<1	----	----	----
+4.75mm	----	1	%	----	<1	----	----	----
+9.5mm	----	1	%	----	<1	----	----	----
+19.0mm	----	1	%	----	<1	----	----	----
+37.5mm	----	1	%	----	<1	----	----	----
+75.0mm	----	1	%	----	<1	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	8	----	----	----
Silt (2-60 µm)	----	1	%	----	10	----	----	----
Sand (0.06-2.00 mm)	----	1	%	----	82	----	----	----
Gravel (>2mm)	----	1	%	----	<1	----	----	----
Cobbles (>6cm)	----	1	%	----	<1	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	2.60	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	----	----	----	----
Calcium	7440-70-2	50	mg/kg	----	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	----	----	----	----	----
Potassium	7440-09-7	50	mg/kg	----	170	----	----	120
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	4480	----	----	2440
Arsenic	7440-38-2	5	mg/kg	----	<5	----	----	<5
Cadmium	7440-43-9	1	mg/kg	----	<1	----	----	<1
Chromium	7440-47-3	2	mg/kg	----	6	----	----	7
Copper	7440-50-8	5	mg/kg	----	<5	----	----	<5
Lead	7439-92-1	5	mg/kg	----	<5	----	----	6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS1	SS2	SS6	QA-01	SS5
				Client sampling date / time	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-006	EB1627495-007	EB1627495-008	EB1627495-009	EB1627495-010
					Result	Result	Result	Result	Result
EG005T: Total Metals by ICP-AES - Continued									
Nickel	7440-02-0	2	mg/kg		----	**2**	----	----	**12**
Zinc	7440-66-6	5	mg/kg		----	**20**	----	----	**18**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		----	<0.1	----	----	<0.1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		----	**2.17**	----	----	**1.44**
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		**0.0003**	<0.0002	<0.0002	**0.0003**	<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		**0.0010**	**0.0105**	**0.0010**	**0.0008**	**0.0004**
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0004**	**0.0004**	<0.0002	**0.0004**	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	**0.0004**	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	**0.0004**	<0.0002	<0.0002	**0.0002**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	**0.0003**	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	**0.0003**	<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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS1	SS2	SS6	QA-01	SS5
				Client sampling date / time	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-006	EB1627495-007	EB1627495-008	EB1627495-009	EB1627495-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0017**	**0.0123**	**0.0010**	**0.0015**	**0.0006**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0013**	**0.0105**	**0.0010**	**0.0011**	**0.0004**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0017**	**0.0109**	**0.0010**	**0.0015**	**0.0004**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**97.0**	**99.0**	**101**	**97.0**	**109**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS3	SS4	GW01-0.2	GW01-0.5	GW01-3.1
			Client sampling date / time	[17-Nov-2016]	[17-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-011	EB1627495-012	EB1627495-014	EB1627495-015	EB1627495-017
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	2.0	3.7	26.8	----	17.8
EA150: Particle Sizing								
+75µm	----	1	%	----	----	----	99	----
+150µm	----	1	%	----	----	----	97	----
+300µm	----	1	%	----	----	----	30	----
+425µm	----	1	%	----	----	----	6	----
+600µm	----	1	%	----	----	----	<1	----
+1180µm	----	1	%	----	----	----	<1	----
+2.36mm	----	1	%	----	----	----	<1	----
+4.75mm	----	1	%	----	----	----	<1	----
+9.5mm	----	1	%	----	----	----	<1	----
+19.0mm	----	1	%	----	----	----	<1	----
+37.5mm	----	1	%	----	----	----	<1	----
+75.0mm	----	1	%	----	----	----	<1	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	----	<1	----
Silt (2-60 µm)	----	1	%	----	----	----	1	----
Sand (0.06-2.00 mm)	----	1	%	----	----	----	99	----
Gravel (>2mm)	----	1	%	----	----	----	<1	----
Cobbles (>6cm)	----	1	%	----	----	----	<1	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	----	----	2.67	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	----	----	----	----
Calcium	7440-70-2	50	mg/kg	----	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	----	----	----	----	----
Potassium	7440-09-7	50	mg/kg	----	----	<50	----	<50
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	130	----	780
Arsenic	7440-38-2	5	mg/kg	----	----	<5	----	<5
Cadmium	7440-43-9	1	mg/kg	----	----	<1	----	<1
Chromium	7440-47-3	2	mg/kg	----	----	<2	----	<2
Copper	7440-50-8	5	mg/kg	----	----	<5	----	<5
Lead	7439-92-1	5	mg/kg	----	----	<5	----	<5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS3	SS4	GW01-0.2	GW01-0.5	GW01-3.1
				Client sampling date / time	[17-Nov-2016]	[17-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-011	EB1627495-012	EB1627495-014	EB1627495-015	EB1627495-017
					Result	Result	Result	Result	Result
EG005T: Total Metals by ICP-AES - Continued									
Nickel	7440-02-0	2	mg/kg		----	----	<2	----	<2
Zinc	7440-66-6	5	mg/kg		----	----	<5	----	<5
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		----	----	<0.1	----	<0.1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		----	----	**1.08**	----	**0.97**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<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
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<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
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0163**	**0.0004**	<0.0002	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		**0.0015**	<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
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0011**	<0.0002	<0.0002	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0017**	<0.0002	<0.0002	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0020**	<0.0002	<0.0002	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0056**	**0.0003**	<0.0002	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		**0.0086**	**0.0004**	<0.0002	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		**0.0112**	**0.0006**	<0.0002	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		**0.0045**	**0.0008**	<0.0002	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		**0.0034**	**0.0006**	<0.0002	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS3	SS4	GW01-0.2	GW01-0.5	GW01-3.1
				Client sampling date / time	[17-Nov-2016]	[17-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-011	EB1627495-012	EB1627495-014	EB1627495-015	EB1627495-017
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		**0.0003**	<0.0002	<0.0002	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0043**	**0.0008**	<0.0005	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		**0.0006**	<0.0005	<0.0005	----	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0616**	**0.0039**	<0.0002	----	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0163**	**0.0004**	<0.0002	----	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0310**	**0.0015**	<0.0002	----	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**105**	**96.0**	**109**	----	**108**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW02-0.8	GW02-4.5	GW03-0.2	GW03-2.0	GW03-3.0
			Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-021	EB1627495-024	EB1627495-026	EB1627495-028	EB1627495-029
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	20.1	22.6	6.4	21.0	----
EA150: Particle Sizing								
+75µm	----	1	%	89	----	----	----	----
+150µm	----	1	%	81	----	----	----	----
+300µm	----	1	%	10	----	----	----	----
+425µm	----	1	%	2	----	----	----	----
+600µm	----	1	%	<1	----	----	----	----
+1180µm	----	1	%	<1	----	----	----	----
+2.36mm	----	1	%	<1	----	----	----	----
+4.75mm	----	1	%	<1	----	----	----	----
+9.5mm	----	1	%	<1	----	----	----	----
+19.0mm	----	1	%	<1	----	----	----	----
+37.5mm	----	1	%	<1	----	----	----	----
+75.0mm	----	1	%	<1	----	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	8	----	----	----	----
Silt (2-60 µm)	----	1	%	3	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	89	----	----	----	----
Gravel (>2mm)	----	1	%	<1	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.67	----	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	----	----	<50	----
Calcium	7440-70-2	50	mg/kg	----	----	----	<50	----
Magnesium	7439-95-4	50	mg/kg	----	----	----	<50	----
Potassium	7440-09-7	50	mg/kg	<50	50	<50	<50	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	2090	1420	270	1670	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	3	<2	<2	<2	----
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	----
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW02-0.8	GW02-4.5	GW03-0.2	GW03-2.0	GW03-3.0
				Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-021	EB1627495-024	EB1627495-026	EB1627495-028	EB1627495-029
					Result	Result	Result	Result	Result
EG005T: Total Metals by ICP-AES - Continued									
Nickel	7440-02-0	2	mg/kg		<2	<2	<2	<2	----
Zinc	7440-66-6	5	mg/kg		<5	<5	<5	<5	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**4.24**	**0.86**	**0.99**	----	**1.26**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<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
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<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
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW02-0.8	GW02-4.5	GW03-0.2	GW03-2.0	GW03-3.0
			Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-021	EB1627495-024	EB1627495-026	EB1627495-028	EB1627495-029
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<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
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**99.0**	**104**	**99.0**	----	**96.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW05-0.2	GW05-3.0	GW04-1.0	GW04-4.0	GW06-1.0
			Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[17-Nov-2016]	[17-Nov-2016]	[17-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-032	EB1627495-035	EB1627495-041	EB1627495-043	EB1627495-047
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	12.0	20.2	18.8	19.5	20.4
EA150: Particle Sizing								
+75µm	----	1	%	----	----	----	----	----
+150µm	----	1	%	----	----	----	----	----
+300µm	----	1	%	----	----	----	----	----
+425µm	----	1	%	----	----	----	----	----
+600µm	----	1	%	----	----	----	----	----
+1180µm	----	1	%	----	----	----	----	----
+2.36mm	----	1	%	----	----	----	----	----
+4.75mm	----	1	%	----	----	----	----	----
+9.5mm	----	1	%	----	----	----	----	----
+19.0mm	----	1	%	----	----	----	----	----
+37.5mm	----	1	%	----	----	----	----	----
+75.0mm	----	1	%	----	----	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	----	----	----
Silt (2-60 µm)	----	1	%	----	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	----	----	----	----	----
Gravel (>2mm)	----	1	%	----	----	----	----	----
Cobbles (>6cm)	----	1	%	----	----	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	----	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	----	----	----	----
Calcium	7440-70-2	50	mg/kg	----	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	----	----	----	----	----
Potassium	7440-09-7	50	mg/kg	170	<50	<50	<50	<50
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	3680	2240	80	560	<50
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	11	<2	<2	<2	<2
Copper	7440-50-8	5	mg/kg	8	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW05-0.2	GW05-3.0	GW04-1.0	GW04-4.0	GW06-1.0
				Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[17-Nov-2016]	[17-Nov-2016]	[17-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-032	EB1627495-035	EB1627495-041	EB1627495-043	EB1627495-047
					Result	Result	Result	Result	Result
EG005T: Total Metals by ICP-AES - Continued									
Nickel	7440-02-0	2	mg/kg		**21**	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg		**23**	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**1.31**	**2.29**	**0.29**	**0.85**	**0.10**
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)	67906-42-7	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW05-0.2	GW05-3.0	GW04-1.0	GW04-4.0	GW06-1.0
			Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[17-Nov-2016]	[17-Nov-2016]	[17-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-032	EB1627495-035	EB1627495-041	EB1627495-043	EB1627495-047
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**91.0**	**100**	**99.0**	**103**	**103**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW06-4.0	QA-05	----	----	----
			Client sampling date / time	[17-Nov-2016]	[17-Nov-2016]	----	----	----
Compound	CAS Number	LOR	Unit	EB1627495-050	EB1627495-051	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	18.6	20.5	----	----	----
EA150: Particle Sizing								
+75µm	----	1	%	----	----	----	----	----
+150µm	----	1	%	----	----	----	----	----
+300µm	----	1	%	----	----	----	----	----
+425µm	----	1	%	----	----	----	----	----
+600µm	----	1	%	----	----	----	----	----
+1180µm	----	1	%	----	----	----	----	----
+2.36mm	----	1	%	----	----	----	----	----
+4.75mm	----	1	%	----	----	----	----	----
+9.5mm	----	1	%	----	----	----	----	----
+19.0mm	----	1	%	----	----	----	----	----
+37.5mm	----	1	%	----	----	----	----	----
+75.0mm	----	1	%	----	----	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	----	----	----
Silt (2-60 µm)	----	1	%	----	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	----	----	----	----	----
Gravel (>2mm)	----	1	%	----	----	----	----	----
Cobbles (>6cm)	----	1	%	----	----	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	----	----	----	----
ED093T: Total Major Cations								
Sodium	7440-23-5	50	mg/kg	----	----	----	----	----
Calcium	7440-70-2	50	mg/kg	----	----	----	----	----
Magnesium	7439-95-4	50	mg/kg	----	----	----	----	----
Potassium	7440-09-7	50	mg/kg	<50	----	----	----	----
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	670	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	<2	----	----	----	----
Copper	7440-50-8	5	mg/kg	<5	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW06-4.0	QA-05	----	----	----
				Client sampling date / time	[17-Nov-2016]	[17-Nov-2016]	----	----	----
Compound	CAS Number	LOR	Unit		EB1627495-050	EB1627495-051	--------	--------	--------
					Result	Result	----	----	----
EG005T: Total Metals by ICP-AES - Continued									
Nickel	7440-02-0	2	mg/kg		<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg		<5	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		**0.78**	----	----	----	----
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		<0.0002	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	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	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW06-4.0	QA-05	----	----	----
				Client sampling date / time	[17-Nov-2016]	[17-Nov-2016]	----	----	----
Compound	CAS Number	LOR	Unit		EB1627495-050	EB1627495-051	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
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		<0.0002	<0.0002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**104**	**95.0**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW01	SW02	SW03	SW04	QA-03
			Client sampling date / time	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1627495-001	EB1627495-002	EB1627495-003	EB1627495-004	EB1627495-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	3.93	6.13	6.48	6.72	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	177	250	2570	7920	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	7	23	35	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	7	23	35	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	59	42	218	568	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	47	81	1290	4420	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	9	11	45	113	----
Magnesium	7439-95-4	1	mg/L	7	8	91	275	----
Sodium	7440-23-5	1	mg/L	37	53	747	2280	----
Potassium	7440-09-7	1	mg/L	2	2	26	78	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	2.55	3.30	41.4	137	----
Total Cations	----	0.01	meq/L	2.68	3.56	42.9	129	----
Ionic Balance	----	0.01	%	----	3.86	1.78	2.91	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.05	<0.05
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.05	<0.05
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.06	<0.05	<0.05
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	<0.02	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	QA-03
				Client sampling date / time	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-001	EB1627495-002	EB1627495-003	EB1627495-004	EB1627495-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.01**	<0.05	<0.05
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.12	<0.12
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.12	<0.12
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.12	<0.12
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.12	<0.12
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.12	<0.12
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.05	<0.05
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	QA-03
				Client sampling date / time	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]	[15-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1627495-001	EB1627495-002	EB1627495-003	EB1627495-004	EB1627495-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.07**	<0.05	<0.05
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.06**	<0.05	<0.05
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.07**	<0.05	<0.05
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	**90.0**	**102**	**103**	**96.0**

Surrogate Control Limits

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

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

Certificate of Analysis

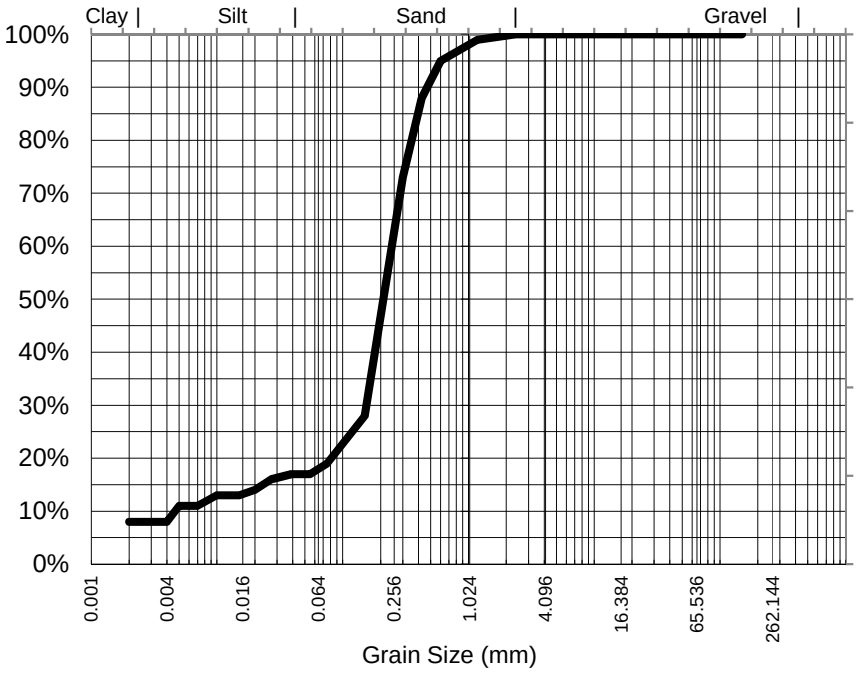
ALS Laboratory Group Pty Ltd
2 Byth Street, Stafford, QLD 4053
pH 07 3552 8678
fax 07 3352 3662
samples.brisbane@alsglobal.com

ALS Environmental

Brisbane, QLD

CLIENT:	Theresehammond	**DATE REPORTED:**	28-Nov-2016
COMPANY:	GHD PTY LTD	**DATE RECEIVED:**	18-Nov-2016
ADDRESS:	GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	**REPORT NO:**	EB1627495-007 / PSD
PROJECT:	Sunshine Coast Airport PSI	**SAMPLE ID:**	SS2

Particle Size Distribution



Particle Size (mm)	Percent Passing
2.36	100%
1.18	99%
0.600	95%
0.425	88%
0.300	73%
0.150	28%
0.075	19%
Particle Size (microns)	
75	19%
55	17%
39	17%
20	14%
10	13%
5	11%
2	8%

Samples analysed as received.

Median Particle Size (mm)*	0.223

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Loss on Pretreatment NA

Sample Description:

Test Method: AS1289.3.6.3 2003

Soil Particle Density (<2.36mm) 2.6 g/cm3

Analysed: 23-Nov-16

Limit of Reporting: 1%

Dispersion Method Shaker

Hydrometer Type ASTM E100

NATA Accreditation: 825 Site: Brisbane
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Satish Trivedi
Soil Chemist
Authorised Signatory

Certificate of Analysis

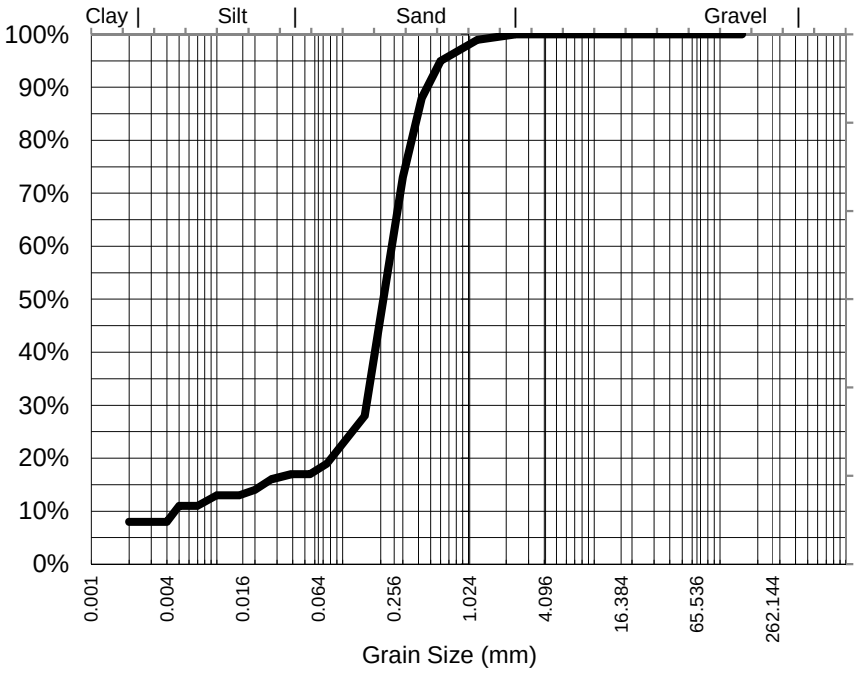
ALS Laboratory Group Pty Ltd
2 Byth Street, Stafford, QLD 4053
pH 07 3552 8678
fax 07 3352 3662
samples.brisbane@alsglobal.com

ALS Environmental

Brisbane, QLD

CLIENT:	Theresehammond	**DATE REPORTED:**	28-Nov-2016
COMPANY:	GHD PTY LTD	**DATE RECEIVED:**	18-Nov-2016
ADDRESS:	GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	**REPORT NO:**	EB1627495-007DUP / PSD
PROJECT:	Sunshine Coast Airport PSI	**SAMPLE ID:**	SS2

Particle Size Distribution



Particle Size (mm)	Percent Passing
2.36	100%
1.18	99%
0.600	95%
0.425	88%
0.300	73%
0.150	28%
0.075	19%
Particle Size (microns)	
75	19%
55	17%
39	17%
20	14%
10	13%
5	11%
2	8%

Samples analysed as received.

Median Particle Size (mm)*	0.223

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Loss on Pretreatment NA

Sample Description:

Test Method: AS1289.3.6.3 2003

Soil Particle Density (<2.36mm) 2.61 g/cm3

Analysed: 23-Nov-16

Limit of Reporting: 1%

Dispersion Method Shaker

Hydrometer Type ASTM E100

NATA Accreditation: 825 Site: Brisbane
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Certificate of Analysis

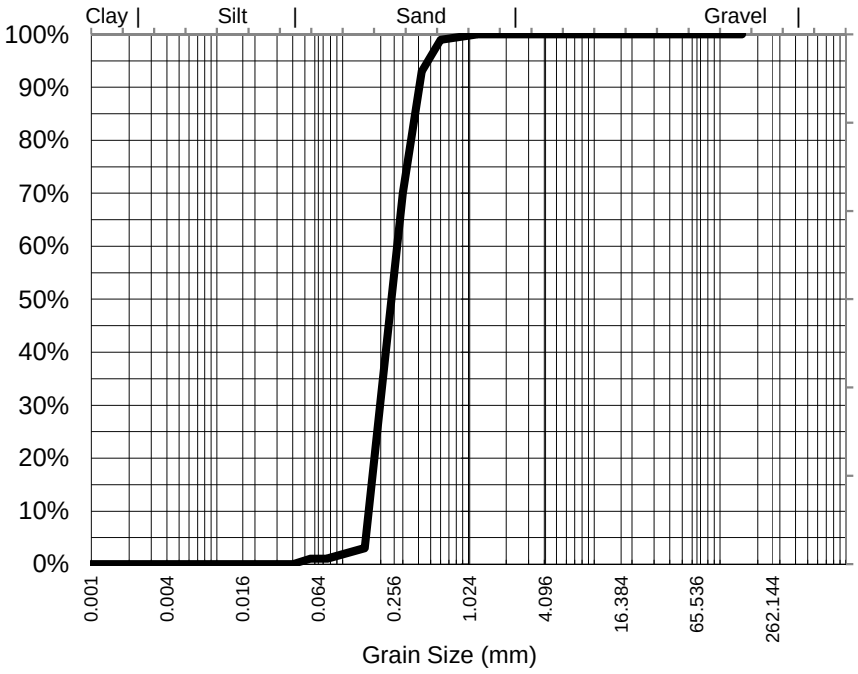
ALS Laboratory Group Pty Ltd
2 Byth Street, Stafford, QLD 4053
pH 07 3552 8678
fax 07 3352 3662
samples.brisbane@alsglobal.com

ALS Environmental

Brisbane, QLD

CLIENT:	Theresehammond	**DATE REPORTED:**	28-Nov-2016
COMPANY:	GHD PTY LTD	**DATE RECEIVED:**	18-Nov-2016
ADDRESS:	GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	**REPORT NO:**	EB1627495-015 / PSD
PROJECT:	Sunshine Coast Airport PSI	**SAMPLE ID:**	GW01-0.5

Particle Size Distribution



Particle Size (mm)	Percent Passing
1.18	100%
0.600	99%
0.425	93%
0.300	70%
0.150	3%
0.075	1%
Particle Size (microns)	
75	1%
56	1%
40	0%

Median Particle Size (mm)*	0.255

Samples analysed as received.

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:	AS1289.3.6.3 states that this method is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly	**Analysed:**	23-Nov-16
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:		**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.3 2003	**Hydrometer Type**	ASTM E100

Soil Particle Density (<2.36mm) 2.67 g/cm3

Satish Trivedi
Soil Chemist
Authorised Signatory

Certificate of Analysis

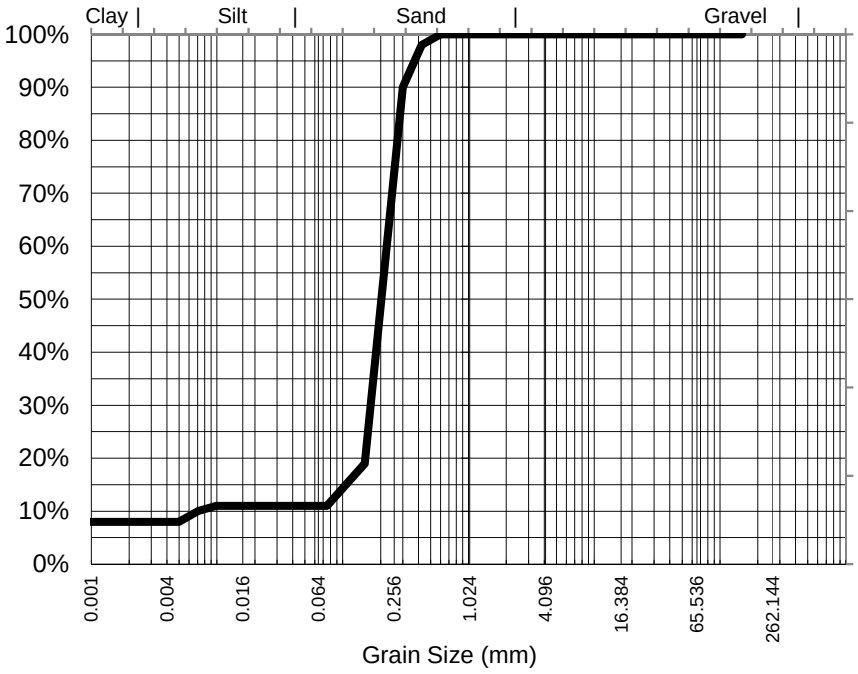
ALS Laboratory Group Pty Ltd
2 Byth Street, Stafford, QLD 4053
pH 07 3552 8678
fax 07 3352 3662
samples.brisbane@alsglobal.com

ALS Environmental

Brisbane, QLD

CLIENT:	Theresehammond	**DATE REPORTED:**	28-Nov-2016
COMPANY:	GHD PTY LTD	**DATE RECEIVED:**	18-Nov-2016
ADDRESS:	GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	**REPORT NO:**	EB1627495-021 / PSD
PROJECT:	Sunshine Coast Airport PSI	**SAMPLE ID:**	GW02-0.8

Particle Size Distribution



Particle Size (mm)	Percent Passing
0.600	100%
0.425	98%
0.300	90%
0.150	19%
0.075	11%
Particle Size (microns)	
75	11%
56	11%
40	11%
20	11%
10	11%
5	8%
1	8%

Median Particle Size (mm)*	0.215

Samples analysed as received.

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Loss on Pretreatment NA

Sample Description:

Test Method: AS1289.3.6.3 2003

Soil Particle Density (<2.36mm) 2.67 g/cm3

Analysed: 23-Nov-16

Limit of Reporting: 1%

Dispersion Method Shaker

Hydrometer Type ASTM E100

NATA Accreditation: 825 Site: Brisbane
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Satish Trivedi
Soil Chemist
Authorised Signatory

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1627495**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Project	: Sunshine Coast Airport PSI	Date Samples Received	: 18-Nov-2016
Order number	: 3134249	Date Analysis Commenced	: 21-Nov-2016
C-O-C number	: ----	Issue Date	: 29-Nov-2016
Sampler	: BERNICE NG		
Site	: ----		
Quote number	: ----		
No. of samples received	: 50		
No. of samples analysed	: 27		

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*
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils, 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 (%)*
EA055: Moisture Content (QC Lot: 663451)									
EB1627092-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	4.8	4.6	2.67	No Limit
EB1627092-011	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	15.2	15.4	1.46	0% - 50%
EA055: Moisture Content (QC Lot: 663452)									
EB1627495-021	GW02-0.8	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	20.1	20.0	0.549	0% - 20%
EA055: Moisture Content (QC Lot: 665184)									
EB1627495-009	QA-01	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	11.8	12.9	8.64	0% - 50%
ES1626481-007	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	13.0	12.9	1.48	0% - 50%
ED093T: Total Major Cations (QC Lot: 663450)									
EB1627495-007	SS2	ED093T: Sodium	7440-23-5	50	mg/kg	60	70	0.00	No Limit
		ED093T: Potassium	7440-09-7	50	mg/kg	170	180	6.68	No Limit
		ED093T: Calcium	7440-70-2	50	mg/kg	2460	2100	15.6	0% - 20%
		ED093T: Magnesium	7439-95-4	50	mg/kg	1040	990	5.15	0% - 20%
EB1627495-032	GW05-0.2	ED093T: Sodium	7440-23-5	50	mg/kg	160	150	10.0	No Limit
		ED093T: Potassium	7440-09-7	50	mg/kg	170	170	0.00	No Limit
		ED093T: Calcium	7440-70-2	50	mg/kg	1980	1740	13.0	0% - 20%
		ED093T: Magnesium	7439-95-4	50	mg/kg	3520	3620	2.94	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 663448)									
EB1627434-005	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	6	36.2	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	6	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	15	16	7.49	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 663448) - continued									
EB1627434-005	Anonymous	EG005T: Aluminium	7429-90-5	50	mg/kg	2620	2680	2.32	0% - 20%
EB1627495-021	GW02-0.8	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	3	3	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	2090	2000	4.41	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 663449)									
EB1627434-005	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB1627495-021	GW02-0.8	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 664612)									
EB1627328-002	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.51	0.51	0.00	0% - 20%
EB1627495-021	GW02-0.8	EP003: Total Organic Carbon	----	0.02	%	4.24	4.20	0.896	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 662957)									
EB1627495-006	SS1	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	0.0003	0.0003	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	0.0010	0.0010	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB1627495-024	GW02-4.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 662957)									
EB1627495-006	SS1	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	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

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: 662957) - continued									
EB1627495-006	SS1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EB1627495-024	GW02-4.5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 662957)									
EB1627495-006	SS1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB1627495-024	GW02-4.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 662957)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 662957) - continued									
EB1627495-006	SS1	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
EB1627495-024	GW02-4.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 662394)									
EB1627466-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.87	6.86	0.146	0% - 20%
EB1627466-025	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.41	8.46	0.593	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 662054)									
EB1627495-001	SW01	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	177	178	0.564	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 662393)									
EB1627466-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	45	42	6.94	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	45	42	6.94	0% - 20%
EB1627466-025	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	11	14	20.7	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	147	144	2.13	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	158	158	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 662423)									
EB1627466-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	12	0.00	0% - 50%
EB1627466-025	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	167	165	1.25	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 662424)									
EB1627466-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	48	48	0.00	0% - 20%
EB1627466-025	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1450	1460	0.670	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 662234)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 662234) - continued									
EB1627466-021	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	476	479	0.527	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	957	977	2.07	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2880	2930	1.52	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	44	45	0.00	0% - 20%
EB1627495-001	SW01	ED093F: Calcium	7440-70-2	1	mg/L	9	9	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	7	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	37	36	3.37	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 662963)									
EB1627365-001	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	0.07	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 662963)									
EB1627365-001	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
		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: 662963)									
EB1627365-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit

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: 662963) - continued									
EB1627365-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 662963)									
EB1627365-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 662963)									
EB1627365-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.08	0.09	11.8	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED093T: Total Major Cations (QCLot: 663450)								
ED093T: Sodium	7440-23-5	50	mg/kg	<50	----	----	----	----
ED093T: Potassium	7440-09-7	50	mg/kg	<50	----	----	----	----
ED093T: Calcium	7440-70-2	50	mg/kg	<50	----	----	----	----
ED093T: Magnesium	7439-95-4	50	mg/kg	<50	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 663448)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	118.9 mg/kg	98.8	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1.87125 mg/kg	103	88	117
EG005T: Chromium	7440-47-3	2	mg/kg	<2	22.7 mg/kg	100	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	55 mg/kg	102	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	72.1 mg/kg	104	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	16.6 mg/kg	103	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	182.3 mg/kg	109	87	127
EG035T: Total Recoverable Mercury by FIMS (QCLot: 663449)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.09821 mg/kg	83.1	78	122
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 664612)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	100 %	101	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 662957)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.5	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.7	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.0	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.4	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 662957)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00125 mg/kg	113	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.2	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.3	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.1	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.2	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.6	53	134

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 662957) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.4	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 662957)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.6	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.3	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.9	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.8	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.9	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 662957)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.2	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.9	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	91.1	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	112	60	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EA005P: pH by PC Titrator (QCLot: 662394)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 662054)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	100	88	112
				<10	2000 mg/L	91.2	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 662393)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.5	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 662423)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	113	85	118
				<1	100 mg/L	99.5	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 662424)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	90	115
				<1	1000 mg/L	107	90	115
ED093F: Dissolved Major Cations (QCLot: 662234)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----

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
ED093F: Dissolved Major Cations (QCLot: 662234) - continued								
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	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 662963)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	86.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	103	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	0.5 µg/L	87.6	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 662963)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.5 µg/L	85.6	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	113	71	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	92.0	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	109	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 662963)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	107	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	114	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	123	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	99.1	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	96.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 662963)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	90.0	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	110	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	110	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 662963) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	80.6	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 663448)							
EB1627434-006	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	119	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	109	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	115	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	107	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	107	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	113	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	110	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 663449)							
EB1627434-006	Anonymous	EG035T: Mercury	7439-97-6	2.5 mg/kg	87.0	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 662957)							
EB1627495-006	SS1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	97.5	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	89.4	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	100	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	109	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.5	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.00125 mg/kg	106	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 662957)							
EB1627495-006	SS1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00125 mg/kg	93.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	78.5	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	75.5	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	99.1	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	91.2	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	101	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	78.0	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	85.7	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	98.9	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	80.8	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	71.1	30	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 662957)							
EB1627495-006	SS1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	75.7	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	81.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	65.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	77.5	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	82.7	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	101	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	81.2	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 662957)							
EB1627495-006	SS1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	114	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	93.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	81.0	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	87.4	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 662423)							
EB1627466-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	88.3	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 662424)							
EB1627466-003	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	94.7	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 662963)							
EB1627365-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	103	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	103	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	104	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	111	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	96.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.5 µg/L	98.6	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 662963)							
EB1627365-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.5 µg/L	89.2	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	83.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	79.8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	101	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	101	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: 662963) - continued							
EB1627365-001	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	99.8	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	86.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	114	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	97.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	90.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	98.8	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 662963)							
EB1627365-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	94.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	111	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	119	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	104	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	89.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	101	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	108	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 662963)							
EB1627365-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	104	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	112	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	116	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	81.2	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1627495**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Telephone	: +61-7-3243 7222
Project	: Sunshine Coast Airport PSI	Date Samples Received	: 18-Nov-2016
Site	: ----	Issue Date	: 29-Nov-2016
Sampler	: BERNICE NG	No. of samples received	: 50
Order number	: 3134249	No. of samples analysed	: 27

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

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
SW01, SW02, SW03, SW04	----	----	----	22-Nov-2016	15-Nov-2016	**7**
ED093F: Dissolved Major Cations						
Clear Plastic Bottle - Natural						
SW01, SW02, SW03, SW04	----	----	----	24-Nov-2016	22-Nov-2016	**2**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
HDPE Soil Jar (EA055-103)							
SS1, SS6	**15-Nov-2016**	**----**	----	----	**23-Nov-2016**	29-Nov-2016	✓
HDPE Soil Jar (EA055-103)							
SS3, SS4, QA-05	**17-Nov-2016**	**----**	----	----	**23-Nov-2016**	01-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA055-103)							
SS2	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	29-Nov-2016	✓
Soil Glass Jar - Unpreserved (EA055-103)							
QA-01	**15-Nov-2016**	**----**	----	----	**23-Nov-2016**	29-Nov-2016	✓
Soil Glass Jar - Unpreserved (EA055-103)							
SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-2.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**----**	----	----	**22-Nov-2016**	30-Nov-2016	✓
Soil Glass Jar - Unpreserved (EA055-103)							
GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0	**17-Nov-2016**	**----**	----	----	**22-Nov-2016**	01-Dec-2016	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA150: Particle Sizing							
Snap Lock Bag (EA150H)							
SS2	**15-Nov-2016**	**----**	----	----	**28-Nov-2016**	14-May-2017	✓
Snap Lock Bag (EA150H)							
GW01-0.5, GW02-0.8	**16-Nov-2016**	**----**	----	----	**28-Nov-2016**	15-May-2017	✓
EA150: Soil Classification based on Particle Size							
Snap Lock Bag (EA150H)							
SS2	**15-Nov-2016**	**----**	----	----	**28-Nov-2016**	14-May-2017	✓
Snap Lock Bag (EA150H)							
GW01-0.5, GW02-0.8	**16-Nov-2016**	**----**	----	----	**28-Nov-2016**	15-May-2017	✓
EA152: Soil Particle Density							
Snap Lock Bag (EA152)							
SS2	**15-Nov-2016**	**----**	----	----	**28-Nov-2016**	14-May-2017	✓
Snap Lock Bag (EA152)							
GW01-0.5, GW02-0.8	**16-Nov-2016**	**----**	----	----	**28-Nov-2016**	15-May-2017	✓
ED093T: Total Major Cations							
Soil Glass Jar - Unpreserved (ED093T)							
SS2	**15-Nov-2016**	**25-Nov-2016**	14-May-2017	✓	**25-Nov-2016**	14-May-2017	✓
Soil Glass Jar - Unpreserved (ED093T)							
SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-2.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**25-Nov-2016**	15-May-2017	✓	**25-Nov-2016**	15-May-2017	✓
Soil Glass Jar - Unpreserved (ED093T)							
GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0	**17-Nov-2016**	**25-Nov-2016**	16-May-2017	✓	**25-Nov-2016**	16-May-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
SS2	**15-Nov-2016**	**25-Nov-2016**	14-May-2017	✓	**25-Nov-2016**	14-May-2017	✓
Soil Glass Jar - Unpreserved (EG005T)							
SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-2.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**25-Nov-2016**	15-May-2017	✓	**25-Nov-2016**	15-May-2017	✓
Soil Glass Jar - Unpreserved (EG005T)							
GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0	**17-Nov-2016**	**25-Nov-2016**	16-May-2017	✓	**25-Nov-2016**	16-May-2017	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
SS2	**15-Nov-2016**	**25-Nov-2016**	13-Dec-2016	✓	**26-Nov-2016**	13-Dec-2016	✓
Soil Glass Jar - Unpreserved (EG035T)							
SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-2.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**25-Nov-2016**	14-Dec-2016	✓	**26-Nov-2016**	14-Dec-2016	✓
Soil Glass Jar - Unpreserved (EG035T)							
GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0	**17-Nov-2016**	**25-Nov-2016**	15-Dec-2016	✓	**26-Nov-2016**	15-Dec-2016	✓
EP003: Total Organic Carbon (TOC) in Soil							
Pulp Bag (EP003)							
SS2	**15-Nov-2016**	**23-Nov-2016**	13-Dec-2016	✓	**23-Nov-2016**	13-Dec-2016	✓
Pulp Bag (EP003)							
SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-3.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**23-Nov-2016**	14-Dec-2016	✓	**23-Nov-2016**	14-Dec-2016	✓
Pulp Bag (EP003)							
GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0	**17-Nov-2016**	**23-Nov-2016**	15-Dec-2016	✓	**23-Nov-2016**	15-Dec-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SS1, SS2, SS6	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X)							
SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-3.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**23-Nov-2016**	15-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X)							
SS3, SS4, GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0, QA-05	**17-Nov-2016**	**23-Nov-2016**	16-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP231X)							
QA-01	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS1, SS2, SS6	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-3.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**23-Nov-2016**	15-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS3, SS4, GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0, QA-05	**17-Nov-2016**	**23-Nov-2016**	16-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP231X) QA-01	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS1, SS2, SS6	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-3.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**23-Nov-2016**	15-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS3, SS4, GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0, QA-05	**17-Nov-2016**	**23-Nov-2016**	16-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP231X) QA-01	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS1, SS2, SS6	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-3.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**23-Nov-2016**	15-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS3, SS4, GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0, QA-05	**17-Nov-2016**	**23-Nov-2016**	16-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP231X) QA-01	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS1, SS2, SS6	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS5, GW01-0.2, GW01-3.1, GW02-0.8, GW02-4.5, GW03-0.2, GW03-3.0, GW05-0.2, GW05-3.0	**16-Nov-2016**	**23-Nov-2016**	15-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
HDPE Soil Jar (EP231X) SS3, SS4, GW04-1.0, GW04-4.0, GW06-1.0, GW06-4.0, QA-05	**17-Nov-2016**	**23-Nov-2016**	16-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓
Soil Glass Jar - Unpreserved (EP231X) QA-01	**15-Nov-2016**	**23-Nov-2016**	14-May-2017	✓	**23-Nov-2016**	02-Jan-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) SW01, SW02, SW03, SW04	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	15-Nov-2016	✗

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
SW01, SW02, SW03, SW04	**15-Nov-2016**	**----**	----	----	**21-Nov-2016**	22-Nov-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
SW01, SW02, SW03, SW04	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	29-Nov-2016	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
SW01, SW02, SW03, SW04	**15-Nov-2016**	**----**	----	----	**23-Nov-2016**	13-Dec-2016	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
SW01, SW02, SW03, SW04	**15-Nov-2016**	**----**	----	----	**23-Nov-2016**	13-Dec-2016	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
SW01, SW02, SW03, SW04	**15-Nov-2016**	**----**	----	----	**24-Nov-2016**	22-Nov-2016	×
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW01, SW02, SW03, SW04, QA-03	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	14-May-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
SW01, SW02, SW03, SW04, QA-03	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	14-May-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
SW01, SW02, SW03, SW04, QA-03	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	14-May-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW01, SW02, SW03, SW04, QA-03	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	14-May-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SW01, SW02, SW03, SW04, QA-03	**15-Nov-2016**	**----**	----	----	**22-Nov-2016**	14-May-2017	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Major Cations by ICPAES - Total	ED093T	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	3	30	**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
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
Total Organic Carbon	EP003	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
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
Total Organic Carbon	EP003	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Major Cations by ICPAES - Total	ED093T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	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
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

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							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Soil Particle Density	EA152	SOIL	Soil Particle Density by AS 1289.3.5.1-2006 : Methods of testing soils for engineering purposes - Soil classification tests - Determination of the soil particle density of a soil - Standard method
Major Cations by ICPAES - Total	ED093T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Major cations 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 Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
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	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
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
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	**GHD Pty Ltd**	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT **(List due date):** 5 Days ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	**Brisbane**		
PROJECT: Sunshine Coast airport PFAS groundwater		**ALS QUOTE NO.:** **GHD National Quote**	
ORDER NUMBER: 313424900			
PROJECT MANAGER: Therese Hammond	**CONTACT PH: 0481715953**		
SAMPLER: Bernice Ng	**SAMPLER MOBILE: 0437 500 717**		
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default): Esdat**		
Email Reports to (will default to PM if no other addresses are listed): Therese.Hammond@ghd.com; Bernice.Ng@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): Therese.Hammond@ghd.com			

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 comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
B.Ng			
DATE/TIME:	DATE/TIME:	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	CEC								
1 EB1627495-017	GW01-3.1		S			×								
2 EB1627495-021	GW02-0.8		S			×								
3 EB1627495-041	GW04-1.0		S			×								
4 EB1627495-047	GW06-1.0		S			×								
5 EB1627495-007	SS2		S			×								
6 EB1627495-008	SS6		S			×								
				TOTAL										

Environmental Division
Brisbane
Work Order Reference
EB1630161

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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1630161**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: therese.hammond@ghd.com	E-mail	: Vanessa.Turnbull@alsglobal.com
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Facsimile	: +61 03 8687 8111	Facsimile	: +61-7-3243 7218
Project	: Sunshine Coast airport PFAS groundwater	Page	: 1 of 3
Order number	: 313424900	Quote number	: ES2015GHDSER0820 (EN/005/15)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BERNICE NG		

Dates

Date Samples Received	: 22-Dec-2016 11:59	Issue Date	: 22-Dec-2016
Client Requested Due Date	: 03-Jan-2017	Scheduled Reporting Date	: **03-Jan-2017**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	: RE-BATCH	No. of samples received / analysed	: 6 / 6

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
- **Samples requiring Cation Exchange Capacity analysis have been assigned pH and Electrical Conductivity analysis in order to determine the appropriate CEC method, as per Raymont and Lyons (2011).**
- **The samples in this work order have been re-batched from EB1627495**
- 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 (14 days), Solid (60 days) from date of completion of work order.
- 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.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EB1630161-001 : [16-Nov-2016] : GW01-3.1 - EB1627495-017
EB1630161-002 : [16-Nov-2016] : GW02-0.8 - EB1627495-021
EB1630161-003 : [16-Nov-2016] : GW04-1.0 - EB1627495-041
EB1630161-004 : [16-Nov-2016] : GW06-1.0 - EB1627495-047

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 - EA002 pH (1:5)	SOIL - EA010 (solids): Electrical Conductivity (1:5)
EB1630161-001	[16-Nov-2016]	GW01-3.1 EB1627495-...	✓	✓
EB1630161-002	[16-Nov-2016]	GW02-0.8 EB1627495-...	✓	✓
EB1630161-003	[16-Nov-2016]	GW04-1.0 EB1627495-...	✓	✓
EB1630161-004	[16-Nov-2016]	GW06-1.0 EB1627495-...	✓	✓
EB1630161-005	[15-Nov-2016]	SS2 EB1627495-007	✓	✓
EB1630161-006	[15-Nov-2016]	SS6 EB1627495-008	✓	✓

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 / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA002: pH (1:5)							
GW01-3.1	Soil Glass Jar - Unpreserved	23-Nov-2016	23-Nov-2016	22-Dec-2016	×	----	----
GW02-0.8	Soil Glass Jar - Unpreserved	23-Nov-2016	23-Nov-2016	22-Dec-2016	×	----	----
GW04-1.0	Soil Glass Jar - Unpreserved	23-Nov-2016	23-Nov-2016	22-Dec-2016	×	----	----
GW06-1.0	Soil Glass Jar - Unpreserved	23-Nov-2016	23-Nov-2016	22-Dec-2016	×	----	----
SS2	Soil Glass Jar - Unpreserved	22-Nov-2016	22-Nov-2016	22-Dec-2016	×	----	----
SS6	Soil Glass Jar - Unpreserved	22-Nov-2016	22-Nov-2016	22-Dec-2016	×	----	----
EA010: Electrical Conductivity (1:5)							
GW01-3.1	Soil Glass Jar - Unpreserved	23-Nov-2016	21-Dec-2016	22-Dec-2016	×	----	----
GW02-0.8	Soil Glass Jar - Unpreserved	23-Nov-2016	21-Dec-2016	22-Dec-2016	×	----	----
GW04-1.0	Soil Glass Jar - Unpreserved	23-Nov-2016	21-Dec-2016	22-Dec-2016	×	----	----
GW06-1.0	Soil Glass Jar - Unpreserved	23-Nov-2016	21-Dec-2016	22-Dec-2016	×	----	----
SS2	Soil Glass Jar - Unpreserved	22-Nov-2016	20-Dec-2016	22-Dec-2016	×	----	----
SS6	Soil Glass Jar - Unpreserved	22-Nov-2016	20-Dec-2016	22-Dec-2016	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

BERNICE NG

- *AU Certificate of Analysis - NATA (COA)	Email	bernice.ng@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bernice.ng@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bernice.ng@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bernice.ng@ghd.com
- Chain of Custody (CoC) (COC)	Email	bernice.ng@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	bernice.ng@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	bernice.ng@ghd.com
- EDI Format - XTab (XTAB)	Email	bernice.ng@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	bernice.ng@ghd.com

THERESE HAMMOND

- *AU Certificate of Analysis - NATA (COA)	Email	therese.hammond@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	therese.hammond@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	therese.hammond@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	therese.hammond@ghd.com
- A4 - AU Tax Invoice (INV)	Email	therese.hammond@ghd.com
- Chain of Custody (CoC) (COC)	Email	therese.hammond@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	therese.hammond@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	therese.hammond@ghd.com
- EDI Format - XTab (XTAB)	Email	therese.hammond@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	therese.hammond@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1630161**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Project	: Sunshine Coast airport PFAS groundwater	Date Samples Received	: 22-Dec-2016 11:59
Order number	: 313424900	Date Analysis Commenced	: 23-Dec-2016
C-O-C number	: ----	Issue Date	: 05-Jan-2017 13:55
Sampler	: BERNICE NG		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

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*
Greg Vogel	Laboratory Manager	Brisbane Acid Sulphate Soils, Stafford, QLD
Greg Vogel	Laboratory Manager	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 no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

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

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

- ED007 Exchangeable Cations (Calcium/Magnesium Ratio): Results could not be calculated for samples EB1630161-004 and 006 as the required Calcium or Magnesium analytes were less than reportable limits.
- ED007 Exchangeable Cations (Magnesium/Potassium Ratio): Results could not be calculated for samples EB1630161-001-004 and 006 as the required Magnesium or Potassium analytes were less than reportable limits.
- 28/12/16: CEC methods assigned according to pH/EC decision tree.
- **The samples in this work order have been re-batched from EB1627495**
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW01-3.1 EB1627495-017	GW02-0.8 EB1627495-021	GW04-1.0 EB1627495-041	GW06-1.0 EB1627495-047	SS2 EB1627495-007
			Client sampling date / time	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[16-Nov-2016]	[15-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1630161-001	EB1630161-002	EB1630161-003	EB1630161-004	EB1630161-005
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	6.2	6.7	6.2	6.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	16	27	11	4	46
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	19.9	21.9	18.9	20.6	16.8
ED005: Exchange Acidity								
Exchange Acidity	----	0.1	meq/100g	0.9	----	----	----	----
Exchangeable Aluminium	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	0.1	3.0	0.1	0.1	4.0
Exchangeable Magnesium	----	0.1	meq/100g	0.6	4.7	1.0	<0.1	1.2
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	0.2
Exchangeable Sodium	----	0.1	meq/100g	0.1	0.5	<0.1	<0.1	0.2
Cation Exchange Capacity	----	0.1	meq/100g	1.7	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	8.2	1.1	0.2	5.6
Exchangeable Sodium Percent	----	0.1	%	12.5	6.3	<0.1	<0.1	2.9
Calcium/Magnesium Ratio	----	0.1	-	0.2	0.6	0.1	----	3.3
Magnesium/Potassium Ratio	----	0.1	-	----	----	----	----	7.1
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	50	mg/kg	60	60	<50	<50	2710

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS6 EB1627495-008	----	----	----	----
				Client sampling date / time	[15-Nov-2016]	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1630161-006	--------	--------	--------	--------
					Result	----	----	----	----
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**5.3**	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**18**	----	----	----	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		**7.9**	----	----	----	----
ED005: Exchange Acidity									
Exchange Acidity	----	0.1	meq/100g		**0.6**	----	----	----	----
Exchangeable Aluminium	----	0.1	meq/100g		<0.1	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		<0.1	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		<0.1	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		**0.6**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		**----**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%		**19.1**	----	----	----	----
Calcium/Magnesium Ratio	----	0.1	-		**----**	----	----	----	----
Magnesium/Potassium Ratio	----	0.1	-		**----**	----	----	----	----
EG005T: Total Metals by ICP-AES									
Iron	7439-89-6	50	mg/kg		<50	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1630161**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Project	: Sunshine Coast airport PFAS groundwater	Date Samples Received	: 22-Dec-2016
Order number	: 313424900	Date Analysis Commenced	: 23-Dec-2016
C-O-C number	: ----	Issue Date	: 05-Jan-2017
Sampler	: BERNICE NG		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Greg Vogel	Laboratory Manager	Brisbane Acid Sulphate Soils, Stafford, QLD
Greg Vogel	Laboratory Manager	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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002 : pH (Soils) (QC Lot: 704593)									
EB1630046-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.2	7.2	0.00	0% - 20%
EB1630130-005	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.3	6.3	0.00	0% - 20%
EA002 : pH (Soils) (QC Lot: 704596)									
EB1630161-005	SS2 EB1627495-007	EA002: pH Value	----	0.1	pH Unit	6.6	6.7	2.25	0% - 20%
EB1630231-009	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.0	7.9	1.88	0% - 20%
EA010: Conductivity (QC Lot: 704592)									
EB1630046-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	13	12	0.00	0% - 50%
EB1630130-005	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	497	460	7.73	0% - 20%
EA010: Conductivity (QC Lot: 704597)									
EB1630161-005	SS2 EB1627495-007	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	46	42	9.48	0% - 20%
EB1630231-009	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2520	2170	15.2	0% - 20%
EA055: Moisture Content (QC Lot: 704600)									
EB1630044-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	<1.0	<1.0	0.00	No Limit
EB1630161-002	GW02-0.8 EB1627495-021	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	21.9	21.7	0.970	0% - 20%
ED005: Exchange Acidity (QC Lot: 707120)									
EB1630130-002	Anonymous	ED005: Exchange Acidity	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED005: Exchangeable Aluminium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
ED007: Exchangeable Cations (QC Lot: 707119)									
EB1630046-001	Anonymous	ED007: Exchangeable Calcium	----	0.1	meq/100g	6.3	5.9	6.85	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	6.6	6.1	6.93	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.1	0.1	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.00	No Limit
EB1630161-005	SS2 EB1627495-007	ED007: Exchangeable Calcium	----	0.1	meq/100g	4.0	4.0	0.00	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	1.2	1.2	0.00	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED007: Exchangeable Cations (QC Lot: 707119) - continued									
EB1630161-005	SS2 EB1627495-007	ED007: Exchangeable Potassium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
ED007: Exchangeable Cations (QC Lot: 707121)									
EB1630130-002	Anonymous	ED007: Exchangeable Calcium	----	0.1	meq/100g	4.8	4.8	0.00	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	4.3	4.3	0.00	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.5	0.4	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 704591)									
EB1630044-001	Anonymous	EG005T: Iron	7439-89-6	50	mg/kg	3060	2900	5.22	0% - 20%
EB1630161-006	SS6 EB1627495-008	EG005T: Iron	7439-89-6	50	mg/kg	<50	<50	0.00	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002 : pH (Soils) (QCLot: 704593)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	99.8	98	102
EA002 : pH (Soils) (QCLot: 704596)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	99.8	98	102
EA010: Conductivity (QCLot: 704592)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.6	97	103
EA010: Conductivity (QCLot: 704597)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	98.9	97	103
ED005: Exchange Acidity (QCLot: 707120)								
ED005: Exchange Acidity	----	0.1	meq/100g	<0.1	----	----	----	----
ED005: Exchangeable Aluminium	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Cations (QCLot: 707119)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	15.5 meq/100g	99.2	79	113
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	9.87 meq/100g	101	85	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.561 meq/100g	93.2	70	122
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	11.2 meq/100g	98.5	76	112
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	37.131 meq/100g	99.5	82	112
ED007: Exchangeable Cations (QCLot: 707121)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	15.5 meq/100g	103	79	113
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	9.87 meq/100g	107	85	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.561 meq/100g	102	70	122
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	11.2 meq/100g	107	76	112
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	37.131 meq/100g	105	82	112
EG005T: Total Metals by ICP-AES (QCLot: 704591)								
EG005T: Iron	7439-89-6	50	mg/kg	<50	34900 mg/kg	78.2	70	120

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.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1630161**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Telephone	: +61-7-3243 7222
Project	: Sunshine Coast airport PFAS groundwater	Date Samples Received	: 22-Dec-2016
Site	: ----	Issue Date	: 05-Jan-2017
Sampler	: BERNICE NG	No. of samples received	: 6
Order number	: 313424900	No. of samples analysed	: 6

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

- **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 : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002 : pH (Soils)						
Soil Glass Jar - Unpreserved						
SS2 - EB1627495-007, SS6 - EB1627495-008	28-Dec-2016	22-Nov-2016	**36**	----	----	----
Soil Glass Jar - Unpreserved						
GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	28-Dec-2016	23-Nov-2016	**35**	----	----	----
EA010: Conductivity						
Soil Glass Jar - Unpreserved						
SS2 - EB1627495-007, SS6 - EB1627495-008	28-Dec-2016	22-Nov-2016	**36**	----	----	----
Soil Glass Jar - Unpreserved						
GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	28-Dec-2016	23-Nov-2016	**35**	----	----	----
EA055: Moisture Content						
Soil Glass Jar - Unpreserved						
SS2 - EB1627495-007, SS6 - EB1627495-008	----	----	----	23-Dec-2016	29-Nov-2016	**24**
Soil Glass Jar - Unpreserved						
GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	----	----	----	23-Dec-2016	30-Nov-2016	**23**
ED005: Exchange Acidity						
Soil Glass Jar - Unpreserved						
SS6 - EB1627495-008	30-Dec-2016	13-Dec-2016	**17**	03-Jan-2017	13-Dec-2016	**21**
Soil Glass Jar - Unpreserved						
GW01-3.1 - EB1627495-017	30-Dec-2016	14-Dec-2016	**16**	03-Jan-2017	14-Dec-2016	**20**
ED007: Exchangeable Cations						
Soil Glass Jar - Unpreserved						
SS2 - EB1627495-007, SS6 - EB1627495-008	30-Dec-2016	13-Dec-2016	**17**	03-Jan-2017	13-Dec-2016	**21**
Soil Glass Jar - Unpreserved						
GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	30-Dec-2016	14-Dec-2016	**16**	03-Jan-2017	14-Dec-2016	**20**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Total Metals by ICP-AES	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved (EA002) SS2 - EB1627495-007, SS6 - EB1627495-008	**15-Nov-2016**	**28-Dec-2016**	22-Nov-2016	×	**28-Dec-2016**	28-Dec-2016	✓
Soil Glass Jar - Unpreserved (EA002) GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	**16-Nov-2016**	**28-Dec-2016**	23-Nov-2016	×	**28-Dec-2016**	28-Dec-2016	✓
EA010: Conductivity							
Soil Glass Jar - Unpreserved (EA010) SS2 - EB1627495-007, SS6 - EB1627495-008	**15-Nov-2016**	**28-Dec-2016**	22-Nov-2016	×	**28-Dec-2016**	25-Jan-2017	✓
Soil Glass Jar - Unpreserved (EA010) GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	**16-Nov-2016**	**28-Dec-2016**	23-Nov-2016	×	**28-Dec-2016**	25-Jan-2017	✓
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103) SS2 - EB1627495-007, SS6 - EB1627495-008	**15-Nov-2016**	**----**	----	----	**23-Dec-2016**	29-Nov-2016	×
Soil Glass Jar - Unpreserved (EA055-103) GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	**16-Nov-2016**	**----**	----	----	**23-Dec-2016**	30-Nov-2016	×
ED005: Exchange Acidity							
Soil Glass Jar - Unpreserved (ED005) SS6 - EB1627495-008	**15-Nov-2016**	**30-Dec-2016**	13-Dec-2016	×	**03-Jan-2017**	13-Dec-2016	×
Soil Glass Jar - Unpreserved (ED005) GW01-3.1 - EB1627495-017	**16-Nov-2016**	**30-Dec-2016**	14-Dec-2016	×	**03-Jan-2017**	14-Dec-2016	×
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007) SS2 - EB1627495-007, SS6 - EB1627495-008	**15-Nov-2016**	**30-Dec-2016**	13-Dec-2016	×	**03-Jan-2017**	13-Dec-2016	×
Soil Glass Jar - Unpreserved (ED007) GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	**16-Nov-2016**	**30-Dec-2016**	14-Dec-2016	×	**03-Jan-2017**	14-Dec-2016	×

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
SS2 - EB1627495-007, SS6 - EB1627495-008	**15-Nov-2016**	**23-Dec-2016**	14-May-2017	✓	**28-Dec-2016**	14-May-2017	✓
Soil Glass Jar - Unpreserved (EG005T)							
GW01-3.1 - EB1627495-017, GW02-0.8 - EB1627495-021, GW04-1.0 - EB1627495-041, GW06-1.0 - EB1627495-047	**16-Nov-2016**	**23-Dec-2016**	15-May-2017	✓	**28-Dec-2016**	15-May-2017	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	4	29	**13.79**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	3	15	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	6	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Metals by ICP-AES	EG005T	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 104)
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchange Acidity by 1M Potassium Chloride	ED005	SOIL	In house: referenced to Rayment and Lyons, (2011), method 15G1. This method is unsuitable for near neutral and alkaline soils. NATA accreditation does not cover performance of this service.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)

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

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

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

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com

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

☐SYD Ph: 02

☐TOW Ph: 07

☐WO Ph: 0

Environmental Division
Brisbane
Work Order Reference
EB1628319

Telephone : +61-7-3243 7222

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☑ Standard TAT (List due date): 5 Days	FOR LABORATORY
OFFICE: Brisbane		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?
PROJECT: Sunshine Coast airport PFAS groundwater	ALS QUOTE NO.: GHD National Quote	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bric receipt?
ORDER NUMBER: 313424900		COC: 1 2 3 4 5 6 7	Random Sample Temp
PROJECT MANAGER: Therese Hammond	CONTACT PH: 0481715953	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Bernice Ng	SAMPLER MOBILE: 0437 500 717		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	
Bernice	JY		
DATE/TIME: 30/11/16	DATE/TIME: 12:35 30-11-16	DATE/TIME:	DATE/TIME:

Email Reports to (will default to PM if no other addresses are listed): Therese.Hammond@ghd.com; Bernice.Ng@ghd.com

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

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	PFAS Extended Suite	Major Ions, Alkalinity	TDS	pH					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	GW01	29/11/2016	W			×	×	×	×					
2	GW02	29/11/2016	W			×	×	×	×					
3	GW03	29/11/2016	W			×	×	×	×					
4	GW04	29/11/2016	W			×	×	×	×					
5	GW05	29/11/2016	W			×	×	×	×					
6	GW06	29/11/2016	W			×	×	×	×					
7	QA-01	29/11/2016	W			×								
8	QA-02	29/11/2016	W			×								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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1628319**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: therese.hammond@ghd.com	E-mail	: Vanessa.Turnbull@alsglobal.com
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Facsimile	: +61 03 8687 8111	Facsimile	: +61-7-3243 7218
Project	: 313424900 Sunshine Coast airport PFAS groundwater	Page	: 1 of 2
Order number	: 313424900	Quote number	: ES2015GHDSER0820 (EN/005/15)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BERNICE NG		

Dates

Date Samples Received	: 30-Nov-2016 12:35 PM	Issue Date	: 30-Nov-2016
Client Requested Due Date	: 07-Dec-2016	Scheduled Reporting Date	: **07-Dec-2016**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 3.0°C - Ice present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 7 / 7

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
- ***30/11/16*: SRN has been resent to acknowledge cancellation of pH analysis per email request received from Bernice Ng on 30/11/16.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Sample 'QA-02' has been forwarded to Eurofins as per Chain of Custody request
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- 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.**

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 to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EB1628319-001	[29-Nov-2016]	GW01	✓	✓	✓
EB1628319-002	[29-Nov-2016]	GW02	✓	✓	✓
EB1628319-003	[29-Nov-2016]	GW03	✓	✓	✓
EB1628319-004	[29-Nov-2016]	GW04	✓	✓	✓
EB1628319-005	[29-Nov-2016]	GW05	✓	✓	✓
EB1628319-006	[29-Nov-2016]	GW06	✓	✓	✓
EB1628319-007	[29-Nov-2016]	QA-01		✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

BERNICE NG

- *AU Certificate of Analysis - NATA (COA)	Email	bernice.ng@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bernice.ng@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bernice.ng@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bernice.ng@ghd.com
- Chain of Custody (CoC) (COC)	Email	bernice.ng@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	bernice.ng@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	bernice.ng@ghd.com
- EDI Format - XTab (XTAB)	Email	bernice.ng@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	bernice.ng@ghd.com

THERESE HAMMOND

- *AU Certificate of Analysis - NATA (COA)	Email	therese.hammond@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	therese.hammond@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	therese.hammond@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	therese.hammond@ghd.com
- A4 - AU Tax Invoice (INV)	Email	therese.hammond@ghd.com
- Chain of Custody (CoC) (COC)	Email	therese.hammond@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	therese.hammond@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	therese.hammond@ghd.com
- EDI Format - XTab (XTAB)	Email	therese.hammond@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	therese.hammond@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1628319**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Project	: 313424900 Sunshine Coast airport PFAS groundwater	Date Samples Received	: 30-Nov-2016 12:35
Order number	: 313424900	Date Analysis Commenced	: 30-Nov-2016
C-O-C number	: ----	Issue Date	: 07-Dec-2016 22:17
Sampler	: BERNICE NG		
Site	: ----		
Quote number	: ----		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

When 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.

- ED041G (Sulfate as SO4 2-): Samples were diluted due to matrix interference. LOR adjusted accordingly.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW01	GW02	GW03	GW04	GW05
			Client sampling date / time	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]
Compound	CAS Number	LOR	Unit	EB1628319-001	EB1628319-002	EB1628319-003	EB1628319-004	EB1628319-005
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**718**	**272**	**130**	**124**	**2080**
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	**25**	**30**	**2**	**56**	**31**
Total Alkalinity as CaCO3	----	1	mg/L	**25**	**30**	**2**	**56**	**31**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**7**	<25	**5**	<25	**40**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**26**	**51**	**34**	**21**	**186**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**4**	**3**	**3**	**4**	**11**
Magnesium	7439-95-4	1	mg/L	**8**	**4**	**4**	**12**	**24**
Sodium	7440-23-5	1	mg/L	**25**	**60**	**24**	**25**	**112**
Potassium	7440-09-7	1	mg/L	**3**	**1**	**1**	**2**	**2**
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**1.38**	**2.04**	**1.10**	**1.71**	**6.70**
Total Cations	----	0.01	meq/L	**2.02**	**3.11**	**1.55**	**2.32**	**7.45**
Ionic Balance	----	0.01	%	**18.9**	**20.9**	**16.8**	**15.2**	**5.29**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW01	GW02	GW03	GW04	GW05
				Client sampling date / time	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1628319-001	EB1628319-002	EB1628319-003	EB1628319-004	EB1628319-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW01	GW02	GW03	GW04	GW05
				Client sampling date / time	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]	[29-Nov-2016]
Compound	CAS Number	LOR	Unit		EB1628319-001	EB1628319-002	EB1628319-003	EB1628319-004	EB1628319-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<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	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.0**	**98.0**	**93.0**	**105**	**109**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW06	QA-01	----	----	----
			Client sampling date / time	[29-Nov-2016]	[29-Nov-2016]	----	----	----
Compound	CAS Number	LOR	Unit	EB1628319-006	EB1628319-007	--------	--------	--------
				Result	Result	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**164**	----	----	----	----
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	**24**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**24**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**12**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**2**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**2**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**16**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**2**	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**0.82**	----	----	----	----
Total Cations	----	0.01	meq/L	**1.01**	----	----	----	----
Ionic Balance	----	0.01	%	**10.6**	----	----	----	----
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	**0.03**	**0.03**	----	----	----
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	**0.08**	**0.07**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	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	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW06	QA-01	----	----	----
				Client sampling date / time	[29-Nov-2016]	[29-Nov-2016]	----	----	----
Compound	CAS Number	LOR	Unit		EB1628319-006	EB1628319-007	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.04**	**0.04**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.05**	**0.04**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.03**	**0.05**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW06	QA-01	----	----	----
				Client sampling date / time	[29-Nov-2016]	[29-Nov-2016]	----	----	----
Compound	CAS Number	LOR	Unit		EB1628319-006	EB1628319-007	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**0.23**	**0.23**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.11**	**0.10**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.23**	**0.23**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**108**	----	----	----

Surrogate Control Limits

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1628319**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 03 8687 8000	Telephone	: +61-7-3243 7222
Project	: 313424900 Sunshine Coast airport PFAS groundwater	Date Samples Received	: 30-Nov-2016
Order number	: 313424900	Date Analysis Commenced	: 30-Nov-2016
C-O-C number	: ----	Issue Date	: 07-Dec-2016
Sampler	: BERNICE NG		
Site	: ----		
Quote number	: ----		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 674829)									
EB1627881-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3780	3820	0.987	0% - 20%
EB1628275-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	386	400	3.56	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 677763)									
EB1628322-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	102	104	1.37	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	102	104	1.37	0% - 20%
EB1628312-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	2	68.8	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	2	68.8	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 674542)									
EB1628169-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	3	0.00	No Limit
EB1628343-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	22	22	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 674543)									
EB1628169-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	119	119	0.00	0% - 20%
EB1628343-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14	14	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 676377)									
EB1627895-030	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	605	624	3.08	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	731	742	1.45	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	722	737	2.01	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	241	248	2.90	0% - 20%
EB1627895-021	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	580	543	6.49	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	681	646	5.26	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 676377) - continued									
EB1627895-021	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	661	630	4.72	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	232	221	4.90	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 677027)									
EB1628319-001	GW01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1627569-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 677027)									
EB1628319-001	GW01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1627569-001	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
		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: 677027)									
EB1628319-001	GW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 677027) - continued									
EB1628319-001	GW01	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1627569-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 677027)									
EB1628319-001	GW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1627569-001	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

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: 677027) - continued									
ES1627569-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 677027)									
EB1628319-001	GW01	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1627569-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.04	0.04	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: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 674829)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	99.1	88	112
				<10	2000 mg/L	95.8	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 677763)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	104	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 674542)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	85	118
				<1	100 mg/L	91.4	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 674543)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.5	90	115
				<1	1000 mg/L	92.2	90	115
ED093F: Dissolved Major Cations (QCLot: 676377)								
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	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 677027)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	86.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	95.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	98.2	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	0.5 µg/L	92.8	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 677027)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.5 µg/L	106	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	93.8	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	96.2	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	101	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	93.0	71	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	89.0	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.4	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	107	70	124

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 677027)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	96.4	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	86.0	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	83.1	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	92.2	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	88.6	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	86.0	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 677027)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	100	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	117	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	82.6	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	86.8	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 674542)							
EB1628169-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	104	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 674543)							
EB1628169-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	93.2	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 677027)							
EB1628319-001	GW01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	105	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	109	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	109	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	113	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	115	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.5 µg/L	101	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 677027)							
EB1628319-001	GW01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.5 µg/L	116	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	110	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: 677027) - continued							
EB1628319-001	GW01	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	89.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	111	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	106	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	101	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	117	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	105	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	102	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	104	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	121	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 677027)							
EB1628319-001	GW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	104	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	114	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	111	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	117	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	124	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	87.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	101	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 677027)							
EB1628319-001	GW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	97.6	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	95.0	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	102	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	94.8	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1628319**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS THERESE HAMMOND	Telephone	: +61-7-3243 7222
Project	: 313424900 Sunshine Coast airport PFAS groundwater	Date Samples Received	: 30-Nov-2016
Site	: ----	Issue Date	: 07-Dec-2016
Sampler	: BERNICE NG	No. of samples received	: 7
Order number	: 313424900	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
GW01, GW02, GW03, GW04, GW05, GW06	**29-Nov-2016**	**----**	----	----	**05-Dec-2016**	06-Dec-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
GW01, GW02, GW03, GW04, GW05, GW06	**29-Nov-2016**	**----**	----	----	**06-Dec-2016**	13-Dec-2016	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
GW01, GW02, GW03, GW04, GW05, GW06	**29-Nov-2016**	**----**	----	----	**30-Nov-2016**	27-Dec-2016	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
GW01, GW02, GW03, GW04, GW05, GW06	**29-Nov-2016**	**----**	----	----	**30-Nov-2016**	27-Dec-2016	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
GW01, GW02, GW03, GW04, GW05, GW06	**29-Nov-2016**	**----**	----	----	**03-Dec-2016**	06-Dec-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
GW01, GW02, GW03, GW04, GW05, GW06, QA-01	**29-Nov-2016**	**----**	----	----	**03-Dec-2016**	28-May-2017	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
GW01, GW02, GW03, GW04, GW05, GW06, QA-01	**29-Nov-2016**	**----**	----	----	**03-Dec-2016**	28-May-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
GW01, GW02, GW03, GW04, GW05, GW06, QA-01	**29-Nov-2016**	**----**	----	----	**03-Dec-2016**	28-May-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
GW01, GW02, GW03, GW04, GW05, GW06, QA-01	**29-Nov-2016**	**----**	----	----	**03-Dec-2016**	28-May-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
GW01, GW02, GW03, GW04, GW05, GW06, QA-01	**29-Nov-2016**	**----**	----	----	**03-Dec-2016**	28-May-2017	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
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	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

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

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 4971 9600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 5-8 Worrell Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

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

NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

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

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

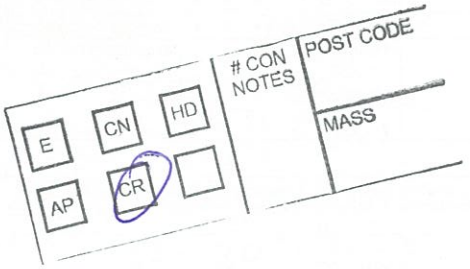
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Brisbane		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Sunshine Coast Airport PSI	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 313424900		COC: 1 (2) 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Therese Hammond	CONTACT PH:	OF: 1 2 (3) 4 5 6 7	Other comment:
SAMPLER: Bernice Ng	SAMPLER MOBILE: 0437 500 717	RELINQUISHED BY:	RECEIVED BY: 9odw
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat	DATE/TIME:	DATE/TIME: 18/11/16 13:25
Email Reports to (will default to PM if no other addresses are listed): Adam.Lupton@ghd.com ; Bernice.Ng@ghd.com		RELINQUISHED BY: D.Bernard	RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed): Adam.Lupton@ghd.com ; Bernice.Ng@ghd.com		DATE/TIME: 21/11/16 8:18	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) and/or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TOC	8 metals K, Al, Si	PFAS (Full Extended Suite)	PSD (% Clay) Mayor 180		Alkalinity	TDS	pH	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	QA-04	16/11/16	S					✓						Forward to Eurofins MGT.
	GW03-0.0	"	S											
	GW03-0.2	"	S			✓	✓	✓						
	GW03-0.5	"	S											
	GW03-2.0	"	S											
	GW03-3.0	"	S			✓	✓	✓						
	GW03-3.5	"	S											
	GW05-0.0	"	S											
	GW05-0.2	"	S			✓	✓	✓						
	GW05-0.5	"	S											
	GW05-1.0	"	S											
	GW05-3.0	"	S			✓	✓	✓						
	GW05-3.5	"	S											
	GW05-4.0	"	S											
	GW04-0.0	17/11/16	S											
	GW04-0.2	"	S											
	GW04-0.5	"	S											
	GW04-1.0	"	S			✓	✓	✓						
	GW04-3.0	"	S											
	GW04-4.0	"	S			✓	✓	✓						
	GW06-0.0	"	S											
	GW06-0.2	"	S											
	GW06-0.5	"	S											
	GW06-1.0	"	S			✓	✓	✓						
	GW06-2.0	"	S											
				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.



Rh

9.45am 10
0
12
10°C

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

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

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

Perth
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 18217

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

Sample Receipt Advice

Company name:	**GHD Pty Ltd QLD**
Contact name:	Therese. Hammond
Project name:	SUNSHINE COAST AIRPORT PSI
Project ID:	313424900
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 21, 2016 9:45 AM
Eurofins | mgt reference:	**524384**

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 : 10 degrees Celsius.

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

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

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

☑ Appropriate sample containers have been used.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

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

Mary Makarios on Phone : +61 3 8564 5000 or by e.mail: MaryMakarios@eurofins.com

Results will be delivered electronically via e.mail to Therese. Hammond - Therese.Hammond@ghd.com.

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

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Phone : +61 8 9251 9600
NATA # 1261
Site # 18217

Company Name:	GHD Pty Ltd QLD	**Order No.:**		**Received:**	Nov 21, 2016 9:45 AM
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:**	524384	**Due:**	Nov 28, 2016
		Phone:	07 3316 3000	**Priority:**	5 Day
		Fax:	07 3316 3333	**Contact Name:**	Therese. Hammond
Project Name:	SUNSHINE COAST AIRPORT PSI				
Project ID:	313424900				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 18217							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	QA_04	Nov 16, 2016		Soil	B16-No17922	X	X
Test Counts						1	1

eurofins | mgt

Certificate of Analysis

GHD Pty Ltd QLD
201 Charlotte St
Brisbane
QLD 4000

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.

Attention: **Therese. Hammond**

Report **524384-S**
Project name SUNSHINE COAST AIRPORT PSI
Project ID 313424900
Received Date Nov 21, 2016

Client Sample ID			**QA_04**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**B16-No17922**
Date Sampled			**Nov 16, 2016**
Test/Reference	LOR	Unit	
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluorobutanesulfonic acid (PFBS)	0.005	mg/kg	< 0.005
Perfluorobutanoic acid (PFBA)	0.005	mg/kg	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	mg/kg	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.005	mg/kg	< 0.005
Perfluoropentanoic acid (PFPeA)	0.005	mg/kg	< 0.005
Perfluorohexanoic acid (PFHxA)	0.005	mg/kg	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	mg/kg	< 0.005
Perfluorooctanoic acid (PFOA)	0.005	mg/kg	< 0.005
Perfluorononanoic acid (PFNA)	0.005	mg/kg	< 0.005
Perfluorodecanoic acid (PFDA)	0.005	mg/kg	< 0.005
Perfluoroundecanoic acid (PFUnA)	0.005	mg/kg	< 0.005
Perfluorododecanoic acid (PFDoA)	0.005	mg/kg	< 0.005
Perfluorotridecanoic acid (PFTrDA)	0.005	mg/kg	< 0.005
Perfluorotetradecanoic acid (PFTeDA)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonamide (PFOSA)	0.01	mg/kg	< 0.01
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.01	mg/kg	< 0.01
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.005	mg/kg	< 0.005
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.005	mg/kg	< 0.005
d5-n-EtFOSAA (surr.)	1	%	110
13C-PFHxA (surr.)	1	%	83
13C8-PFOS (surr.)	1	%	98
% Moisture	1	%	18

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Nov 21, 2016	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
% Moisture	Brisbane	Nov 21, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
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Company Name:	GHD Pty Ltd QLD	**Order No.:**		**Received:**	Nov 21, 2016 9:45 AM
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:**	524384	**Due:**	Nov 28, 2016
		Phone:	07 3316 3000	**Priority:**	5 Day
		Fax:	07 3316 3333	**Contact Name:**	Therese. Hammond
Project Name:	SUNSHINE COAST AIRPORT PSI				
Project ID:	313424900				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 18217							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	QA_04	Nov 16, 2016		Soil	B16-No17922	X	X
Test Counts						1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

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

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	mg/kg	< 0.005			0.005	Pass	
Perfluorobutanoic acid (PFBA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/kg	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanoic acid (PFHxA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.005			0.005	Pass	
Perfluorononanoic acid (PFNA)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanoic acid (PFDA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/kg	< 0.005			0.005	Pass	
Perfluorododecanoic acid (PFDoA)	mg/kg	< 0.005			0.005	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	< 0.005			0.005	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/kg	< 0.01			0.01	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/kg	< 0.01			0.01	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/kg	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/kg	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/kg	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/kg	< 0.005			0.005	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	113			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	119			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	90			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	100			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	106			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	104			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	102			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	99			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	95			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	111			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	93			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	88			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	93			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	124			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	105			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	98			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	96			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S16-No12035	NCP	%	104			50-150	Pass	
Perfluorobutanoic acid (PFBA)	S16-No12035	NCP	%	90			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-No12035	NCP	%	105			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-No12035	NCP	%	87			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-No12035	NCP	%	86			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S16-No12035	NCP	%	84			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S16-No12035	NCP	%	86			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-No12035	NCP	%	95			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S16-No12035	NCP	%	91			50-150	Pass	
Perfluorononanoic acid (PFNA)	S16-No12035	NCP	%	94			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S16-No12035	NCP	%	90			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-No12035	NCP	%	92			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	S16-No12035	NCP	%	54			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S16-No12035	NCP	%	57			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S16-No12035	NCP	%	81			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	S16-No12035	NCP	%	105			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-No12035	NCP	%	139			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-No12035	NCP	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-No12035	NCP	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-No12035	NCP	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-No12035	NCP	%	105			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorobutanoic acid (PFBA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-No12154	NCP	mg/kg	0.048	0.049	1.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorotetradecanoic acid (PFTeDA)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanesulfonamide (PFOSA)	S16-No12154	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-No12154	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-No12154	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-No12154	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-No12154	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B16-Oc28620	NCP	%	4.4	4.2	5.0	30%	Pass	

Quality Control Analyte Summary Compliance

The table below is the actual occurrence of QC performed on the batch of samples within this report and as defined below

Analysis	Samples Analysed	Laboratory Duplicates Reported	Laboratory Matrix Spikes Reported	Method Blanks Reported	Laboratory Control Samples Reported
Per- and Polyfluorinated Alkyl Substances	1	1	1	1	1
% Moisture	1	1	NA	NA	NA

Quality Control Parameter Frequency Compliance follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure April 2011, Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils and US EPA SW-846 Chapter 1: 'Quality Control'.

It comprises the following when a laboratory process batch is deemed to consist of up to 20 samples that are similar in terms of matrix and test procedure, and are processed as one unit for QC purposes. If more than 20 samples are being processed, they are considered as more than one batch.

Method blank

One method blank per process batch.

Laboratory duplicate

There should be at least one duplicate per process batch, or two duplicates if the process batch exceeds 10 samples.

Laboratory control sample (LCS)

There should be at least one LCS per process batch.

Matrix spikes

There should be one matrix spike per matrix type per process batch.

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

Authorised By

Mary Makarios	Analytical Services Manager
Bryan Wilson	Senior Analyst-Metal (QLD)
Jonathon Angell	Senior Analyst-Inorganic (QLD)
Jonathon Angell	Senior Analyst-Organic (QLD)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYD Ph: 02
TOW Ph: 07
WO Ph: 0

Environmental Division Brisbane
Work Order Reference
EB1628319

Telephone : + 61-7-3243 7222

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☑ Standard TAT (List due date): 5 Days ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY
OFFICE: Brisbane			Custody Seal Intact?
PROJECT: Sunshine Coast airport PFAS groundwater	ALS QUOTE NO.: GHD National Quote	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice brid receipt?
ORDER NUMBER: 313424900		COC: 1 2 3 4 5 6 7	Random Sample Temp
PROJECT MANAGER: Therese Hammond	CONTACT PH: 0481715953	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Bernice Ng	SAMPLER MOBILE: 0437 500 717		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat		

RELINQUISHED BY: Bernice Ng	RECEIVED BY: JY	RELINQUISHED BY: D. BRADLEY	M. Hall
DATE/TIME: 30/11/16	DATE/TIME: 12:35 30-11-16	DATE/TIME: 1/12/16 8:15	DATE/TIME: 1/12/16 12:50pm

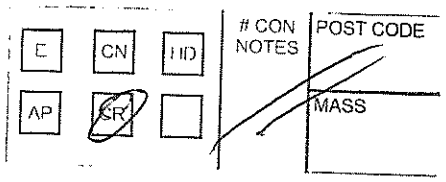
Email Reports to (will default to PM if no other addresses are listed): Therese.Hammond@ghd.com; Bernice.Ng@ghd.com

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

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	PFAS Extended Suite	Major Ions, Alkalinity	TDS	pH					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	GW01	29/11/2016	W			×	×	×	×					
2	GW02	29/11/2016	W			×	×	×	×					
3	GW03	29/11/2016	W			×	×	×	×					
4	GW04	29/11/2016	W			×	×	×	×					
5	GW05	29/11/2016	W			×	×	×	×					
6	GW06	29/11/2016	W			×	×	×	×					
7	QA-01	29/11/2016	W			×								
8	QA-02	29/11/2016	W			×								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.



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7.2

12:50pm

1/12/16

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

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

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

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

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

Sample Receipt Advice

Company name: **GHD Pty Ltd QLD**

Contact name: Therese. Hammond
Project name: SUNSHINE COAST AIRPORT PFAS GROUNDWATER
Project ID: 313424900
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Dec 1, 2016 12:50 PM
Eurofins | mgt reference: **525887**

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 : 7.2 degrees Celsius.

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

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

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

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

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

Mary Makarios on Phone : +61 3 8564 5000 or by e.mail: MaryMakarios@eurofins.com

Results will be delivered electronically via e.mail to Therese. Hammond - Therese.Hammond@ghd.com.

eurofins | mgt

ABN– 50 005 085 521
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web : www.eurofins.com.au

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NATA # 1261 Site # 20794

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

Company Name:	GHD Pty Ltd QLD	**Order No.:**		**Received:**	Dec 1, 2016 12:50 PM
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:** **Phone:** **Fax:**	525887 07 3316 3000 07 3316 3333	**Due:** **Priority:** **Contact Name:**	Dec 8, 2016 5 Day Therese. Hammond
Project Name:	SUNSHINE COAST AIRPORT PFAS GROUNDWATER				
Project ID:	313424900				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 18217						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	QA_02	Nov 29, 2016		Water	B16-De00799	X
Test Counts						1

eurofins | mgt

Certificate of Analysis

GHD Pty Ltd QLD
201 Charlotte St
Brisbane
QLD 4000

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.

Attention: **Therese. Hammond**

Report **525887-W**
Project name SUNSHINE COAST AIRPORT PFAS GROUNDWATER
Project ID 313424900
Received Date Dec 01, 2016

Client Sample ID			**QA_02**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**B16-De00799**
Date Sampled			**Nov 29, 2016**
Test/Reference	LOR	Unit	
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluorobutanesulfonic acid (PFBS)	0.00001	mg/L	< 0.00001
Perfluorobutanoic acid (PFBA)	0.00005	mg/L	0.00011
Perfluorohexanesulfonic acid (PFHxS)	0.00001	mg/L	[N09]0.00003
Perfluorooctanesulfonic acid (PFOS)	0.00001	mg/L	[N09]0.00020
Perfluorodecanesulfonic acid (PFDS)	0.00001	mg/L	< 0.00001
Perfluoropentanoic acid (PFPeA)	0.00001	mg/L	0.00007
Perfluorohexanoic acid (PFHxA)	0.00001	mg/L	0.00008
Perfluoroheptanoic acid (PFHpA)	0.00001	mg/L	0.00006
Perfluorooctanoic acid (PFOA)	0.00001	mg/L	0.00009
Perfluorononanoic acid (PFNA)	0.00001	mg/L	0.00003
Perfluorodecanoic acid (PFDA)	0.00001	mg/L	0.00002
Perfluoroundecanoic acid (PFUnA)	0.00001	mg/L	< 0.00001
Perfluorododecanoic acid (PFDoA)	0.00001	mg/L	< 0.00001
Perfluorotridecanoic acid (PFTrDA)	0.00001	mg/L	< 0.00001
Perfluorotetradecanoic acid (PFTeDA)	0.00001	mg/L	< 0.00001
Perfluorooctanesulfonamide (PFOSA)	0.00005	mg/L	< 0.00005
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.00005	mg/L	< 0.00005
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.00005	mg/L	< 0.00005
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.00001	mg/L	< 0.00001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.00005	mg/L	< 0.00005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.00001	mg/L	< 0.00001
d5-n-EtFOSAA (surr.)	1	%	40
13C-PFHxA (surr.)	1	%	67
13C8-PFOS (surr.)	1	%	54

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Dec 01, 2016	14 Day

- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS

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

Melbourne
2-5 Kingston Town Close
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Company Name:	GHD Pty Ltd QLD	**Order No.:**		**Received:**	Dec 1, 2016 12:50 PM
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:** **Phone:** **Fax:**	525887 07 3316 3000 07 3316 3333	**Due:** **Priority:** **Contact Name:**	Dec 8, 2016 5 Day Therese. Hammond
Project Name:	SUNSHINE COAST AIRPORT PFAS GROUNDWATER				
Project ID:	313424900				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 18217						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	QA_02	Nov 29, 2016		Water	B16-De00799	X
Test Counts						1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

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

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorobutanoic acid (PFBA)	mg/L	< 0.00005			0.00005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/L	< 0.00001			0.00001	Pass	
Perfluoropentanoic acid (PFPeA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorohexanoic acid (PFHxA)	mg/L	< 0.00001			0.00001	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanoic acid (PFOA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorononanoic acid (PFNA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorodecanoic acid (PFDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorododecanoic acid (PFDoA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/L	< 0.00005			0.00005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/L	< 0.00005			0.00005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/L	< 0.00005			0.00005	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/L	< 0.00001			0.00001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/L	< 0.00005			0.00005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/L	< 0.00001			0.00001	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	83			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	127			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	77			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	120			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	51			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	84			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	117			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	84			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	127			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	90			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	76			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	60			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	61			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	66			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	64			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	62			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	61			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	72			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	116			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	76			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B16-No26233	NCP	%	84			50-150	Pass	
Perfluorobutanoic acid (PFBA)	B16-No26233	NCP	%	124			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-No26233	NCP	%	82			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-No26233	NCP	%	109			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-No26233	NCP	%	50			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B16-No26233	NCP	%	77			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B16-No26233	NCP	%	112			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-No26233	NCP	%	81			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B16-No26233	NCP	%	121			50-150	Pass	
Perfluorononanoic acid (PFNA)	B16-No26233	NCP	%	86			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B16-No26233	NCP	%	76			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-No26233	NCP	%	69			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	B16-No26233	NCP	%	56			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-No26233	NCP	%	57			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B16-No26233	NCP	%	64			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-No26233	NCP	%	55			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-No26233	NCP	%	54			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-No26233	NCP	%	52			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-No26233	NCP	%	68			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-No26233	NCP	%	120			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B16-No26233	NCP	%	66			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorobutanoic acid (PFBA)	B16-De00897	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B16-De00897	NCP	mg/L	0.00001	0.00001	5.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B16-De00897	NCP	mg/L	0.00003	0.00003	5.0	30%	Pass	
Perfluorononanoic acid (PFNA)	B16-De00897	NCP	mg/L	0.00005	0.00005	2.0	30%	Pass	
Perfluorodecanoic acid (PFDA)	B16-De00897	NCP	mg/L	0.00002	0.00003	17	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorotetradecanoic acid (PFTeDA)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-De00897	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-De00897	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-De00897	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-De00897	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-De00897	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B16-De00897	NCP	mg/L	0.00019	0.00022	14	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

Authorised By

Mary Makarios	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Appendix I – Calibration Certificates

Gas Detection Air Sampling & Monitoring Environmental & Water Quality Monitoring
Air-Met Scientific Pty Ltd
ABN 73 006 849 949
Ph 1300 137 067

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 12D101325

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Capacity	✓	
	Recharge OK?		
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
	Seal	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. Conductivity	✓	
	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 7.01		288996	7.01pH
2. pH 4.00		pH 4.00		288772	4.02pH
3. EC		2760 mS		NJ1809	2760mS
4. Temp		25.5 °C		Multitherm	25.5 °C
5. Redox (mV)		235.3 mV		NL1774/NL1775	235.3 mV
6. DO		0 ppm		123302	0 ppm

Calibrated by: Chris Lynch

Calibration date: 28-Nov-16

Next calibration due: 27-May-17

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 13E100110

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		ph7.00		288996	pH 7.00
2. pH 4.00		ph4.00		288772	ph 4.00
3. ORP		240mV		nl1774/nl1775	240mV
4. EC		2760uS		nj1809	2760uS
6. D.O		0 ppm		123302	0 ppm
7. Temp		20.5 oC		MultiTherm	20.5 °C

Calibrated by: Ricky Kneebone

Calibration date: 17/10/2016

Next calibration due: 15/04/2017

Oil / Water Interface Meter

Instrument Geotech Interface Meter (60m)
Serial No. 3882

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	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: **Ricky Kneebone**

Calibration date: **14-Nov-16**

Next calibration due: **13-Jan-17**

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **12D100009**

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. D.O		0 ppm		288996	0 ppm
2. Conductivity		2760uS		288772	2760uS
3. pH7		pH 7.00		NL1847/NL1848	pH 7.00
4. pH4		pH 4.00		NJ1809	pH 4.00
5. ORP mV		230.04		123302	230.04
7. Temp °C		21.8		MultiTherm	21.8

Calibrated by: Ricky Kneebone

Calibration date: 14-Nov-16

Next calibration due: 13-May-17

Appendix J – Soil and water disposal dockets

CLEANAWAY
Making a sustainable future possible

ABN 95 066 383 364

26 - 32 POTASSIUM STREET
NARANGBA QLD 4504
Telephone: (07) 3293 5555
Fax: (07) 3204 0816

A Tax Invoice will be posted out for your records

TRANSPORT MANIFEST

MANIFEST #: 28613

QUOTE: _____ **WTC Docket #:** _____

GENERATOR: GHD - Maroochydore Airport

(Address) Code 21 Taylor St
PO Box 1483
Maroochy

PHONE: 0354305 **FAX:** _____

CHARGE TO: _____

RECEIVER:

(Address) Cleanaway Liquids Narangba
~~26-32 Potassium St, Narangba Q 4504; Ph 07 3293 5555~~
ABN 95 066 383 364
~~EPA Lic. No. EPPR00394113~~

_____ (Signature) _____ (Position)

ORDER NUMBER: _____

Correct Shipping Name	Class	Subrisk	UN Number	Packing Group	Haz Chem Code	Type of Package	Number of Packages	Disposal Cost Per Unit ($)	Total Disposal Cost ($)
PFAS contaminated Soil		NO				205	3		
PFAS contaminated ~~Water~~ Soil		NO				205	3		
PFAS contaminated Water		NO				50	1		

Transport of _____ drums / pallets @ $ _____ each

Labour _____ hours@$ _____ each

Material Charges

Other Charges

TOTAL CHARGES

Generator's Signature: _____ Date: 14/12/15

Driver's Signature: _____ Date: _____

GHD

180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au

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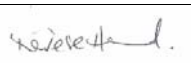
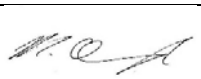
Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A						13/01/2017
Draft B						21/02/2017
Draft C						17/07/2017
0	B Ng	T Hammond		M Clough		19/10/2017

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