



Airservices Australia

Gold Coast Airport, Coolangatta, Queensland
Further Groundwater Investigation Data Report

October 2017

Executive Summary

GHD Pty Ltd (GHD) was engaged by Airservices Australia (Airservices) to complete a Further Groundwater Investigation at the Gold Coast Airport (GCA) and land to the east of the GCA boundary.

The scope of works included:

- Collection of groundwater samples and laboratory analysis from 18 residential properties with operational spear pumps.
- Installation of two groundwater wells down gradient of the former airport aviation rescue and firefighting (ARFF) station which is located on the airport, adjacent to Eastern Avenue and Gold Coast Highway.
- Collection of groundwater samples and laboratory analysis from two new wells (GW17-01 and GW17-02) and three existing groundwater wells (GW16-02, GW16-03 and MWX01) on the eastern boundary of the GCA site.
- Collection of 11 surface water and sediment samples and laboratory analysis from Coolangatta Creek, upstream of the GCA, within the GCA boundary and downstream of the GCA to the discharge point at Kirra Beach.

The scope of this investigation did not constitute a Detailed Site Investigation (as defined by the ASC NEPM), or an investigation of all possible sources of PFAS (or other contaminants) at the site, but were undertaken in general accordance with ASC NEPM.

The results indicate that PFAS is present at the eastern boundary of the GCA and immediately off site to the east in groundwater, surface water and sediment. Exceedances of the adopted assessment criteria are summarised below:

- Six of the 18 groundwater samples obtained from spear pumps located to the east of the GCA reported concentrations of PFAS above the adopted drinking water guideline. All spear pump samples reported PFAS below the adopted recreational water quality guideline.
- Detectable concentrations of PFAS were reported in five of the six groundwater samples obtained from monitoring wells located within the GCA or adjacent to the eastern boundary. The highest concentrations were observed in wells adjacent to the former ARFF fire station and Joint Use Hydrant Installation (JUHI).
- Surface water samples obtained from the open drains within the airport reported concentrations of PFAS above the recreational use guideline. All surface water samples collected from outside the airport boundary reported concentrations of PFAS below the recreational use guideline.
- Surface water and sediment samples obtained from the open drains and waterways within and downstream of the GCA reported detectable concentrations of PFAS which exceed the adopted human health sediment criterion for fish consumption.

A preliminary human health risk assessment was undertaken based on the laboratory analytical results from the spear pump samples. The human health risk assessment concluded that the health risk associated with the use of groundwater extracted for recreational use (including irrigation) is low and acceptable.

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1. Introduction

Airservices Australia (Airservices) engaged GHD Pty Ltd (GHD) to complete a Further Groundwater Investigation at the Gold Coast Airport (GCA) and land to the east of the GCA boundary.

A Preliminary Site Investigation (PSI) was completed at the GCA to identify potential sources of contamination, with a focus on per- and poly-fluoroalkyl substances (PFAS) (GHD, 2016a). Based on the findings of the PSI, a targeted Preliminary Sampling program was completed that focussed on assessing the potential for these impacts to have migrated off the GCA site and to be present in off-site groundwater and surface water (GHD, 2016b).

Airservices commissioned further works (detailed in this report) consisting of targeted on and off-site groundwater, surface water and sediment investigations in vicinity of the eastern perimeter of the GCA boundary. These investigations were undertaken in accordance with the Sampling Analysis and Quality Plan prepared by GHD (GHD, 2017c).

This report documents the methodology and findings of the Further Groundwater Investigations. The site locality and investigation areas are presented in Figure 1, Appendix A. This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4.

1.1 Objective of the preliminary sampling

The objective of the Further Groundwater Investigation was to assess whether PFAS impacts were present in groundwater, surface water and sediment off-site immediately to the east of the GCA.

1.2 Scope of works

A Sampling Analysis and Quality Plan (SAQP) was prepared (GHD, 2017c) based on the outcomes of previous investigations and the objectives in Section 1.1. 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 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 Further Groundwater Investigation did not constitute a Detailed Site Investigation, but was undertaken in general accordance with ASC NEPM (NEPC 2013) and comprised the following activities¹:

- Arrangements to obtain land access for collection of spear pump water samples, as outlined in the Stakeholders Contamination and Consultation Brief (GHD, 2017b).
- Collection of groundwater samples from 18 residential properties with operational spear pumps located directly to the east of the GCA. Laboratory analysis for field parameters (EC, pH, redox, DO), TDS, cations and anions and PFOS/PFOA + extended suite.

¹ National Environment Protection Council (NEPC), *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 No 1* (hereafter referred to as the ASC NEPM)

- Installation of two groundwater wells down gradient of the former ARFF station which is located on the airport, adjacent to Eastern Avenue and Gold Coast Highway. Development of the two new groundwater wells.
- Collection of groundwater and laboratory analysis for field parameters (EC, pH, redox, DO), TDS, cations and anions, PFOS/PFOA + extended suite at the two new groundwater wells and three existing groundwater wells (GW16-02, GW16-03 and MWX01 on the eastern boundary of the site).
- Collection of 11 surface water and sediment samples from Coolangatta Creek, upstream of the GCA, within the GCA boundary and down stream of the GCA to the discharge point at Kirra Beach. Collection and analysis of surface water and sediment samples for field parameters (EC, pH, redox, DO), TDS, cations and anions, PFOS/PFOA + extended suite.
- Preparation of a data report outlining the methodology adopted and the investigation results.

1.3 Methodology references

This Further Groundwater Investigation 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*
- CRC CARE, 2017 Assessment, management and remediation for PFOS and PFOA
- Department of Health, Health Based Guidance Values for PFAS for Use in Site Investigations in Australia, Department of Health, 2017
- Department of Water and Environmental Regulation WA, 2016, Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)
- *Environmental Protection Act 1994 (EP Act)*
- GHD, 2017, *PFAS Investigations – Derivation of PFAS soil and water criteria*
- GHD, 2017. *Airservices Australia, ASA Gold Coast Further Groundwater Investigation Sampling Analysis and Quality Plan*
- 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)*
- National Uniform Drillers Licensing Committee, 2012: Minimum Construction Requirements for Water Bores in Australia, 3rd Edition.

1.4 Limitations

This report has been prepared by GHD for Airservices and may only be used and relied on by Airservices for the purpose agreed between GHD and Airservices 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 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 on the basis of information provided by Airservices, 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. Assessment criteria

The focus of the Further Groundwater Investigation is on PFAS. Accordingly, analytical results have been compared against the Tier 1 criteria contained in the following documents:

- GHD, 2017: PFAS Investigations – Derivation of PFAS soil and water criteria. This document was prepared by GHD for Airservices Australia based on the Food Standards Australia New Zealand (FSANZ) published toxicological review of PFAS chemicals and tolerable daily intake (TDI) values. The derivation of the human health based screening criteria for soil followed the methodology outlined in Schedule B4 (Health Risk Assessment) and B7 (Derivation of Health Investigation Levels) of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (the ASC NEPM).
- CRC CARE, Assessment, management and remediation for PFOS and PFOA, Part 3: Ecological screening levels, 2017 (CRC CARE 2017)
- DoH, Health Based Guidance Values for PFAS for Use in Site Investigations in Australia, Department of Health, 2017 (DoH 2017) - (FSANZ)

The values for the adopted screening / investigation levels from these sources are summarised in Table 1.

Table 1 Adopted PFAS screening criteria

Exposure scenario	PFOS	PFOA	PFHxS +PFOS	Source
Surface water				
Human health (recreational use)		5.6 µg/L	0.7 µg/L	DoH Recreational quality guideline (FSANZ)
Health based screening for fish consumption (fresh water)		0.0029 µg/L	0.0004 µg/L	GHD, 2017 - Health based screening criteria for water and sediment – fish consumption (fresh water)
Health based screening criteria for fish consumption (marine water)		0.0082 µg/L	0.001 µg/L	GHD, 2017 - Health based screening criteria for water and sediment – fish consumption (marine)
Ecological screening levels (fresh water)	0.13 µg/L (95% species protection – slightly to moderately disturbed systems)	220 µg/L (95% species protection – slightly to moderately disturbed systems)		CRC CARE – Screening levels for fresh PFOS and PFOA in aquatic systems – fresh water
Ecological screening levels (marine)	0.29 µg/L (99% species protection) 7.8 µg/L (95% species protection)	3000 µg/L(99% species protection) 8500 µg/L(95% species protection)		CRC CARE – Screening levels for fresh PFOS and PFOA in aquatic systems – marine water
Groundwater				
Human health (drinking water)		0.56 µg/L	0.07 µg/L	DoH Drinking water quality guideline (FSANZ)
Human health (recreational use)		5.6 µg/L	0.7 µg/L	DoH Recreational quality guideline (FSANZ)
Ecological	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 (see below). In 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/criteria listed above			
Sediment				
Human health (fish consumption)		0.0018 mg/kg	0.0002 mg/kg	GHD, 2017 Health based screening criteria for water and sediment – fish consumption

3. Field investigations

3.1 Fieldwork program

The fieldwork program completed by GHD for the site is summarised in Table 2.

Table 2 Summary of fieldwork program

Date	Activity
24-28 July 2017 and 10 August 2017	Collection of groundwater samples from spear pumps located at residential properties to the east of the GCA (refer Section 3.2)
3 August 2017	Underground services location for the two new groundwater wells
10 August 2017	Collection of surface water samples and sediment samples
23 August 2017	Drilling and installation of two new groundwater monitoring wells Development of the newly installed groundwater monitoring wells
30 August 2017	Gauging and sampling of the two new and four existing monitoring wells
11 September 2017	Survey of the two new groundwater monitoring wells

3.2 Spear pump sampling

The methodology for collection of groundwater samples from the spear pumps located at residential properties is summarised in Table 3.

Table 3 Spear pump sampling methodology

Activity	Details
Arrangement of consent to access property and sample spear pump	Residents whose properties were selected for spear pump sampling were contacted prior to sampling to gain consent and determine access arrangements. Consent was received from all properties prior to sampling. The procedure for determining residential access was undertaken in accordance with the Stakeholder Communication and Consultation Brief (GHD, 2017b).
Spear pump sampling	21 samples were collected from spear pumps at 18 residential properties. At one property one sample was collected and analysed directly from the hose (SP14_H) and one from the tap (SP14) for comparative purposes. A second sample was also collected and analysed at a property with a tank (SP5_tank) which is understood to have been filtered following extraction by the spear pump. At another property, samples were collected from two spear pumps (approximately eight and fifteen years old). The sample from the newer spear pump (SP15) was analysed, while the sample from the older spear pump (SP15a) was placed on hold. Approximately 20 litres of groundwater was purged from each spear pump prior to sampling. The collection point of each sample varied between properties, depending on the pump set up. Wherever possible, samples were collected directly from a tap on the pump. Where this was not possible, samples were collected from a hose.

Activity	Details
Sample logging	<p>Field observations and physiochemical parameters (pH, electrical conductivity (EC), dissolved oxygen (DO), oxygen-reduction potential (ORP), temperature and turbidity) were recorded by an environmental scientist. Field results were not recorded at SP18 as this sample was collected at short notice with insufficient time to hire a water quality meter.</p> <p>The field results, a summary of any details provided by the resident, together with the date and time of sampling are presented in Appendix B.</p> <p>Calibration certificates for the water quality meter are provided in Appendix I.</p>
Sample preservation and transport	Samples were placed in laboratory supplied sampling containers and chilled upon collection by storing on ice in an insulated cooler box while on site and in transport to the laboratory. Samples were transferred to the laboratory under Chain of Custody (COC) documentation. COC documentation is presented in the laboratory reports included as Appendix H.
QA/QC	<p>Two QA/QC samples were collected including one intra-laboratory blind sample (QA01) and one inter-laboratory split sample (QA02). Further details are provided in Appendix G.</p> <p>No specific sampling equipment was used as samples were collected directly into laboratory supplied bottles, thus negating the need for a rinsate sample.</p>
Purge water disposal	Purged groundwater from the spear pumps was placed on a grassed surface of the property or at an alternative location in the garden nominated by the resident.

3.3 Surface water and sediment sampling

The surface water and sediment sampling methodology is summarised in Table 4.

Table 4 Surface water and sediment sampling methodology

Activity	Details
Surface water sampling	<p>Surface water samples were collected from 10 locations (refer to Figure 1, Appendix A). A sample was unable to be obtained at SW17-05 as the drainage channel is underground at this location.</p> <p>Samples were collected directly from the surface of water bodies using dedicated laboratory supplied sample bottles. Where necessary, an extendable arm was used to gain access to the water body.</p>
Sediment sampling	<p>Sediment samples were collected at nine of the nominated locations (adjacent to the surface water sampling locations – refer Figure 1, Appendix A). Sample SED17-02 was unable to be obtained as the drain was newly constructed (with rock) and no sediment was present. Sample SED17-05 was not obtained as the drainage channel is underground at this location.</p> <p>Samples were collected directly from the base of the water body in dedicated laboratory supplied sample containers. Where this was not possible, an extendable PVC sampler was used to gain access to the base of the water body. The PVC sampler was decontaminated between each sample location that included initial rinse and scrub with tap water, followed by a tap water rinse, followed by a rinse with deionised water.</p>

Activity	Details
Sample logging	<p>Surface water field observations and physiochemical parameters (pH, EC, DO, ORP, temperature and turbidity) were recorded by an environmental scientist. The results are presented in Appendix B.</p> <p>Sediment sample field observations were also recorded during sampling and are included in Appendix B.</p>
Sample preservation and transport	<p>Samples were placed in laboratory supplied sampling containers and 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 COC documentation. COC documentation is presented in the laboratory reports included as Appendix H.</p>
QA/QC	<p>Two QA/QC surface water samples (SW_QA1 and SW_QA2) and two QA/QC sediment samples (SED_QA1 and SED_QA2) were collected during sampling. The QA/QC samples included one intra-laboratory blind sample and one inter-laboratory blind sample.</p> <p>A rinsate sample (Rinsate) was collected from the PVC stubbing used to collect some sediment samples.</p> <p>Further details are provided in Appendix G.</p>

3.4 Groundwater monitoring and sampling methodology

3.4.1 Groundwater well installation

Two groundwater monitoring wells (GW17-01 and GW17-02) were installed as detailed in Table 5. The objectives and rationale for the two groundwater sampling locations is detailed in the SAQP (GHD, 2017). The location of each groundwater monitoring well is shown in Figure 1, Appendix A. Well construction details are contained in the groundwater well construction logs presented as Appendix C.

Table 5 Groundwater well installation

Details	Activity
Well construction	<p>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.</p> <p>Graded and washed filter sand was installed in and slightly above (0.5 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. Wells were completed at the surface with flush mounted gatic covers concreted below the ground surface. Details of the monitoring wells construction are provided in the borehole logs in Appendix C.</p>
Well survey	<p>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 D.</p>
Well development	<p>The newly installed wells were developed following construction using a bailer. Approximately 35 L of water was removed from each well.</p> <p>GHD considers that the development procedure undertaken was adequate to prepare the wells for collection of representative groundwater samples given the sand geology at the site.</p>

Details	Activity
Decontamination	<p>Decontamination of the drill tip and rods/augers was undertaken through a three stage approach. The process involved an initial rinse and scrub with tap water, followed by a tap water rinse, followed by a rinse with deionised water.</p> <p>A rinsate sample (Drill_rinsate) was collected from the drill tip. Further details are provided in Appendix G.</p>
Soil cuttings and development water disposal	<p>Soil cuttings and development water from the wells were collected in drums for disposal off-site to a licensed facility. Disposal documentation will be included in Appendix J in the final version of this report (not yet received).</p>

3.4.2 Groundwater monitoring and sampling methodology

A total of six groundwater monitoring wells, including two newly installed wells (GW17-01 and GW17-02) and four existing monitoring wells (GW16-01 – GW16-03 and MWX01) were gauged, purged and sampled.

The three existing monitoring wells were selected for sampling due to their proximity to the eastern boundary of the GCA site as well as their previous inclusion in the Preliminary Sampling (GHD 2016b). While the SAQP stated that a sample would be collected from existing well MW12, closer inspection of the site during field works confirmed that the well in this area sampled as part of the 2016 Preliminary Sampling was MWX01 (not MW12 or GCAPL1 as previously reported). For consistency, MWX01 was sampled in place of MW12.

Details of the groundwater monitoring and sampling methodologies are summarised in Table 6.

Table 6 Groundwater gauging and sampling methodology

Details	Activity
Well gauging	<p>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 E.</p> <p>The calibration certificate of the interface probe is provided in Appendix I.</p>
Groundwater sampling	<p>All monitoring wells were purged and sampled through low-flow sampling methods using a Geopump® peristaltic pump.</p> <p>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.</p> <p>Groundwater samples were collected directly from the tubing into laboratory-supplied containers (pre-preserved where appropriate) and filled up to minimise headspace.</p> <p>Groundwater gauging and sampling records are provided in Appendix E.</p>
Sample preservation and transport	<p>Samples were placed in laboratory supplied sampling containers and 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 COC documentation. COC documentation is presented in the laboratory reports contained in Appendix H.</p>

Details	Activity
Decontamination	<p>Decontamination of the interface probe and pump was undertaken through a three stage approach. The process involved an initial rinse and scrub with tap water, followed by a tap water rinse, followed by a rinse with deionised water.</p> <p>Single-use tubing was used for sample collection to minimise potential for cross contamination.</p>
QA/QC	<p>Two QA/QC samples (GW_QA1 and GW_QA2) were collected including one intra-laboratory blind sample and one inter-laboratory blind sample.</p> <p>A rinsate blank sample (GW-rinsate) was also collected from the pump. Further details are provided in Appendix G.</p>
Purge water disposal	<p>Purged water from the well development was placed into sealed drums for disposal off-site to a licensed facility. Disposal documentation will be included in Appendix J in the final version of this report (not yet received).</p>

3.5 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.

3.6 Laboratory analytical program

3.6.1 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 samples, for quality control 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.

3.6.2 Sample analysis

Table 7 summarises the number of soil, groundwater and surface water samples collected site and analysed for the selected analytical suite(s).

Table 7 Laboratory analytical schedule

Sample type	No. primary samples		No. QC samples	Analytical suite
	Collected	Analysed		
Sediment				
Sediment samples	9	9	2	PFAS extended suite ¹
Water				
Groundwater	6	6	2	PFAS extended suite ¹ Major ions and TDS ²
Spear pumps	21	20	2	PFAS extended suite ¹ Major ions and TDS ²
Surface water	10	10	2	PFAS extended suite ¹ Major ions and TDS ²

1. PFAS extended suite: Perfluorooctane sulfonate (PFOS), Perfluorooctanoic acid (PFOA), 6:2 Fluorotelomer sulphonate (6:2 FTS), 8:2 Fluorotelomer sulphonate (8:2 FTS), 10:2 Fluorotelomer sulfonic acid (10:2 FTS), 1H.1H2H.2H-perfluorohexanesulfonic acid (4:2 FTS), N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSA), N-Methyl perfluorooctane sulfonamidoacetic acid (EtFOSA), Perflurohepane sulfonic acid (PFHpS), Perfluoropentanoic acid (PFPeA), Perfluoropentane sulfonic acid (PFPeS), Perfluorobutanoic acid (PFBA), Perfluorotridecanoic acid (PFTriA), N-Ethyl-heptadecafluoroactane sulphonamide (N-Et-FOSA), N-Ethyl-heptadecafluoroactane sulphonamidoethanol (N-Et-FOSE), N-Methyl-heptadecafluoroactane sulphonamide (N-Me-FOSA), N-Methyl-heptadecafluoroactane sulphonamidoethanol (N-Me-FOSE), Perfluorobutane Sulfonate (PFBS), Perfluorodecane Sulfonate (PFDcS), Perfluorodecanoic Acid (PFDcA), Perfluorododecanoic Acid (PFDa), Perfluoroheptanoic Acid (PFHpA), Perfluorohexane Sulfonate (PFHxS), Perfluorohexanoic Acid (PFHxA), Perfluorononanoic Acid (PFNA), Perfluorooctane Sulphonamide (PFOSA), Perfluorotetradecanoic acid (PFTeA), Perfluoroundecanoic Acid (PFUnA)

2. QC samples were analysed for PFAS extended suite only (not major ions and TDS)

4. Results

The following sections summarise the field observations and analytical results collected as part of the Further Groundwater Investigation. Sample locations are shown in Figure 1 of Appendix A. Tabulated results are presented as Appendix F and laboratory analytical reports are presented in Appendix H.

4.1 Groundwater - spear pumps

4.1.1 Field observations and parameters

Groundwater field physiochemical parameters (i.e. temperature, DO, pH, ORP and EC) were recorded on field sheets during the sampling process. The observations at each spear pump sampling location are presented in Appendix B. The spear pump groundwater physiochemical field results are summarised as follows:

- pH results ranged between pH 5.38 (SP12) and pH 7.91 (SP16) indicating slightly acidic to neutral conditions. It is noted that the majority of samples were below pH 7.0, with the exception of SP16 (pH 7.91)
- Electrical Conductivity (EC) measurements indicated fresh conditions, ranging from 78.4 µS/cm (SP14H) to 322.1 µS/cm (SP2)

Water generally appeared to be clear with low turbidity. Some samples were observed to have slight yellow colouring and / or a minor hydrogen sulphide odour.

It is noted that the bore construction details at all spear pump sample locations are unknown, as is the frequency of use, typical volume extraction and age of the spear pumps. Samples were obtained from a range of fittings (such as directly from the pump, from the tap, or from hoses) which may have affected the reliability and accuracy of analytical results collected as part of this work. Any information gained from the resident at the time of sampling (where possible) is also included in Appendix B.

4.1.2 Analytical results

A total of 20 spear pump groundwater samples were analysed for the PFAS extended suite and 19 samples were analysed for major ions and TDS. Tabulated analytical results for groundwater samples obtained from the spear pumps are presented as Table F1 in Appendix F. The analytical results are summarised below.

Physico-chemical parameters

- TDS in the spear pump groundwater samples ranged between 31 mg/L (SP10) to 194 mg/L (SP18).
- Elevated TDS results were generally accompanied with relatively high sodium, calcium, bicarbonate (as CaCO₃), sulphate and chloride results.

Total PFAS summary

- Detectable concentrations of total PFAS (sum of PFAS) were reported in all 20 analysed spear pump groundwater samples, ranging from 0.009 µg/L (SP16) to 0.183 µg/L (SP7).

PFHxS and PFOS

- All spear pump groundwater samples reported detectable concentrations of PFHxS and PFOS, ranging between 0.005 µg/L (SP16) to 0.151 µg/L (SP7).
- Six samples (SP1, SP2, SP4, SP5, SP7 and SP17) report concentrations which exceeded the FSANZ drinking water quality guideline of 0.07 µg/L. All samples were reported below the FSANZ recreational water quality guideline of 0.7 µg/L.

PFOA

- All spear pump groundwater samples reported detectable concentrations of PFOA with the exception of SP3, SP5_tank, SP16 and SP18. Detectable concentrations ranged from 0.002 µg/L (SP13 and SP17) to 0.013 µg/L (SP2).
- All samples reported PFOA concentrations below the adopted FSANZ drinking water quality guideline and FSANZ recreational water guideline of 0.56 µg/L and 5.6 µg/L respectively.

4.2 Groundwater - monitoring wells

4.2.1 Field observations and parameters

Two new groundwater wells were installed as part of these works (GW17-01 and GW17-02). During drilling of the groundwater wells, groundwater was encountered at approximately 3.5 mbgl. Groundwater well construction logs for the two new wells are presented as Appendix C.

Groundwater field physiochemical 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 E. The groundwater physiochemical results are also presented in Appendix F (Table F2), and are summarised below:

- The groundwater pH results ranged between pH 5.01 (GW16-03) to pH 6.29 (GW16-01) indicating slightly acidic to neutral conditions.
- Field EC measurements indicated relatively fresh water conditions, ranging from 75.7 µS/cm (GW17-01) to 212 µS/cm (MWX01).

4.2.2 Analytical results

Six groundwater monitoring wells were sampled and analysed for the PFAS extended suite and major ions and TDS. Tabulated analytical results for the groundwater samples obtained from the monitoring wells are presented as Table F2 in Appendix F. The analytical results are summarised below.

Physico-chemical parameters

- TDS results in samples collected from monitoring wells were generally consistent with the field EC measurements, and ranged between 60 mg/L (GW16-02) and 138 mg/L (MWX01).
- Elevated TDS results were generally accompanied with relatively high sodium, calcium, magnesium, bicarbonate (as CaCO₃) sulphate and chloride results.

Total PFAS summary

- Detectable concentrations of total PFAS (sum of PFAS) were reported in all groundwater monitoring well samples with the exception of GW16-01. Detectable concentrations ranged from 0.07 µg/L (GW16-02 and GW16-03) to 2.85 µg/L (MWX01).

PFHxS and PFOS

- All groundwater monitoring well samples reported detectable concentrations of PFHxS and PFOS with the exception of GW16-01. Detectable concentrations ranged between 0.07 µg/L (GW16-02 and GW16-03) and 2.68 µg/L (MWX01).
- Five locations (GW16-02, GW16-03, GW17-01, GW17-02 and MWX01) reported concentrations of PFHxS and PFOS equal to or exceeding the FSANZ drinking water quality guideline of 0.07 µg/L. Two samples (GW17-01 and MWX01) also exceeded the FSANZ recreational water quality guideline of 0.7 µg/L.

PFOA

- Three groundwater monitoring well samples reported detectable concentrations of PFOA (GW17-01, GW17-02 and MWX01), ranging from 0.01 µg/L to 0.03 µg/L. PFOA was reported below the laboratory limits of reporting at groundwater monitoring well samples GW16-01, GW16-02 and GW16-03
- All groundwater monitoring well samples reported PFOA concentrations below the adopted FSANZ drinking water quality and FSANZ recreational water quality guidelines of 0.56 µg/L and 5.6 µg/L respectively.

4.2.3 Groundwater levels and flow direction

Standing water level (SWL) of the groundwater monitoring wells in this investigation ranged between 2.91 (GW17-02) and 3.89 m below top of casing (bToC) (GW16-03).

All new monitoring wells (GW17-01 and GW17-02) were surveyed to m AHD. Survey data is provided in Appendix D.

Groundwater contours developed as part of the Preliminary Sampling (GHD, 2016b) indicate that groundwater in the north eastern portions of the site flows towards the Pacific Ocean in a general easterly direction. Based on the sand geology, flat topography of the site and proximity to the Pacific Ocean, this is considered to be consistent with the likely flow direction at the time of sampling.

4.3 Surface water

4.3.1 Field observations and parameters

Surface water field physicochemical parameters (i.e. temperature, DO, pH, ORP and EC) were recorded during the sampling process and are presented in Appendix B.

Surface water samples collected from within the open drains adjacent to the airport apron (SW16-01A, SW16-02A and SW16-03A) were typically clear, with low turbidity and suspended solids.

The surface water samples collected in areas adjacent to the Project LIFT construction site (SW17-01, SW17-02 and SW17-03) and downstream of the airport (SW17-04, SW17-06 and SW17-07) were typically pale brown to orange brown with low turbidity and suspended solids. It is important to note that SW17-01, SW17-02 and SW17-03 were collected from either a newly constructed drain or a drain that had recently undergone modification as part of the Project LIFT construction. The Project LIFT construction works are likely to have an impact on the surface and groundwater quality in this area at present.

Surface water sample SW17-08 was collected up stream of the GCA. At the time of sampling, a pump was located in the creek in this area which was reported to be pumping groundwater into the creek to manage surface flows. This also has the potential to impact the surface water quality at this sample location. This sample was brown in colour with moderate turbidity.

The surface water field physicochemical parameters indicated the following:

- Field pH readings of the surface water samples ranged between pH 6.53 (SW17-08) and 7.69 (SW-06) indicating a slightly acidic to alkaline environment.
- Field EC measurements of the surface water collected from surface water upstream and within the airport (SW16-01A, SW16-02A, SW16-03A and SW17-08) were indicative of fresh water and ranged from 425 µS/cm (SW16-01A) to 1,137 µS/cm (SW16-02A).

Field EC measurements of the surface water sampled in the southern portion of the airport, adjacent the Project LIFT site (SW17-01 and SW17-02) were slightly brackish with results of 1,170 µS/cm and 2,610 µS/cm respectively.

Field EC measurements of the surface water sampled downstream of the airport, and ultimately closer to the Pacific Ocean (SW17-03, SW17-05, SW17-06 and SW17-07) were brackish to saline and ranged from 4,130 mS/cm (SW17-07) to 14,090 µS/cm (SW17-03).

4.3.2 Analytical results

Ten surface water samples were analysed by the primary laboratory for the extended PFAS suite. Tabulated analytical results for the surface water samples obtained are presented as Table F3 and Table F4 in Appendix F. Table F3 shows analytical results against the adopted human health criteria and Table F4 shows the analytical results against the adopted ecological criteria. The analytical results are summarised below.

Physico-chemical parameters

- The reported TDS concentrations in the surface water samples analysed ranged from 253 mg/L (SW16-01A) to 9750 mg/L (SW17-06).

Total PFAS summary

Detectable concentrations of total PFAS (sum of PFAS) were reported in all ten analysed surface water samples, ranging from 0.028 µg/L (SW17-07) to 4.08 µg/L (SW16-02A). The highest total PFAS concentrations were reported in surface water sampled from the open drains in the vicinity of the current ARFF station located within the airport.

PFOA

Detectable concentrations of PFOA were reported in all samples with the exception of SW17-07 and SW17-08. The following exceedances of the adopted screening criteria were identified:

- PFOA concentrations were reported above the health based screening criteria for fish consumption (fresh water) (0.0029 µg/L) in all surface water samples with the exception of SW17-07 and SW17-08.
- Surface water samples SW16-02A, SW16-03A, SW17-01, SW17-02 and SW17-03 exceed the health based screening level for fish consumption (marine) (0.0082 µg/L)
- All samples reported concentrations below the FSANZ PFAS recreational water quality guideline and the freshwater and marine screening levels for fresh PFOA in aquatic systems (99%, 95%, 90% and 85%).

PFOS

Detectable concentrations of PFOS were reported in all ten surface water samples, ranging from 0.014 µg/L (SW17-07) to 2.12 µg/L (SW16-02A). The following summarises the exceedances of the adopted screening criteria:

- PFOS concentrations in surface water samples SW16-02A, SW16-03A, SW17-01, SW17-02, SW17-03, SW17-04 and SW17-06 exceeded the ecological screening level for fresh PFOS in aquatic systems (freshwater), 95% species protection (0.13 µg/L).
- PFOS concentrations in surface water samples SW16-02A, SW16-03A, SW17-01, SW17-02 and SW17-03 exceed the ecological screening level for fresh PFOS in aquatic systems (marine), 99% species protection. All other samples were reported below this guideline level.

All surface water samples were reported below the ecological screening level for fresh PFOS in aquatic systems (freshwater), 95% species protection.

Sum of PFHxS and PFOS

- All surface water samples exceeded the health based screening criteria for fish consumption (freshwater) criteria of 0.0004 µg/L.
- All surface water samples exceeded the health based screening criteria for fish consumption (marine) criteria of 0.001 µg/L.
- Surface water samples SW16-02A, SW16-03A, SW17-01, SW17-02 and SW17-03 exceeded the FSANZ PFAS recreational water quality guideline of 0.7 µg/L. It is noted that recreational use of this water is not likely given that these locations are in stormwater drains within the airport and adjacent to aircraft movement areas

4.4 Sediment

4.4.1 Field observations

The sediment samples consisted of sand, silty sand or gravelly sand. Field observations including a detailed observation of the sediment type and any other observations were collected during sampling and are presented in Appendix B.

4.4.2 Analytical results

Nine sediment samples were analysed by the primary laboratory for PFAS extended suite. Tabulated analytical results for the surface water samples obtained are presented as Table F5 in Appendix F.

Total PFAS summary

- Detectable concentrations of total PFAS (sum of PFAS) were reported in eight of the nine analysed sediment samples. Detectable concentrations of total PFAS ranged from 0.0004 mg/kg (SED16-03A) to 0.197 mg/kg (SED16-02A).

PFOA

- Detectable concentrations of PFOA were reported in sediment samples SED17-01 (0.0005 mg/kg) and SED16-02A (0.0012 mg/kg). All other sediment samples reported concentrations of PFOA below the laboratory limits of reporting.
- All PFOA results were reported below the adopted sediment health based screening criteria for fish consumption of 0.0018 mg/kg.

Sum of PFHxS and PFOS

- Detectable concentrations of PFHxS and PFOS were reported in all sediment samples with the exception of SED17-08, ranging from 0.004 mg/kg (SED16-03A) to 0.194 mg/kg (SED16-02A).
- All samples with the exception of SED17-08 reported concentrations of PFHxS and PFOS above the health based screening criteria for fish consumption of 0.0002 mg/kg.

5. Quality assurance and quality control

A summary of the Quality Assurance and Quality Control (QA/QC) Data Quality Indicators (DQIs) used for this investigation and an assessment of the compliance of the data set with these QA/QC DQIs is presented in Table 8. Further details of the QA/QC assessment program are contained in Appendix G.

Table 8 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 criteria met. Refer to Appendix H	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 and Appendix H	Yes - Some minor exceedances - refer to Appendix G.
Analysis of inter-laboratory duplicate samples	1 for every 20 samples RPD 30% - 50%	AS4482.1-2005	Refer to Appendix G and Appendix H	Yes - Some minor exceedances - refer to Appendix G.
Analysis of laboratory method blanks	No contamination of blanks	NEPM (2013)	All analytes were less than the laboratory LOR for ALS	Yes
Analysis of matrix and laboratory control spikes	Recoveries within the laboratory specified recovery limits	NEPM (2013)	Outliers reported for primary laboratory samples (Refer to Appendix G)	Outliers were mostly due to the matrix interferences of the samples

Item	Objective	Reference	Summary of Results	Compliance
Analysis of laboratory surrogates	No surrogate recovery outliers	NEPM (2013)	<p>Outliers reported for secondary laboratory (556687). Since no positive results were reported for any PFAS compounds in this sample, no data was affected.</p> <p>Refer to Appendix G</p>	Yes
Analysis of laboratory duplicates	Frequencies and Relative Percent Differences (RPDs) within guideline and internal laboratory limits	NEPM (2013)	Criteria met	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. Summary

6.1 Summary of results

This Further Groundwater Investigation was undertaken to determine if PFAS impacts are present in groundwater, surface water and sediment sample locations. The scope of this investigation did not constitute a detailed site investigation or an investigation of all possible sources of PFAS (or other contaminants) at the site.

Based on the data gathered and reviewed as part of these works the following summary is made:

- Groundwater results from samples taken from the spear pumps at 18 residential properties to the east of the GCA boundary reported detectable concentrations of PFAS. Six of the 18 samples reported concentrations of PFHxS and PFOS above the FSANZ PFAS drinking water guideline. All groundwater samples obtained from spear pumps to the east of the GCA reported PFAS below the adopted recreational water quality guidelines.
- Detectable concentrations of PFAS were reported in five of the six groundwater samples obtained from groundwater monitoring wells located within the GCA or adjacent to the eastern boundary. The highest concentrations were observed in wells adjacent the former ARFF station (located adjacent to Eastern Avenue) and JUHI (MWX01 and GW17-01).
- Surface water samples obtained from the open drains within the airport reported concentrations of PFAS above the FSANZ recreational use guideline. It is noted that recreational use of this water is not likely given that these locations are in stormwater drains within the airport and adjacent to aircraft movement areas. All surface water samples collected from outside of the airport site boundary reported concentrations of PFAS below the FSANZ recreational use guideline.
- All surface water samples collected within and downstream of the airport reported concentrations of PFAS which exceeded the adopted freshwater and marine water human health criteria for fish consumption.
- PFOS concentrations also exceeded selected ecological screening criteria at sampling locations SW16-02A, SW16-03A, SW17-01, SW17-02, SW17-03 within the airport and at downstream locations (off-site) SW17-04 and SW17-06.
- Sediment samples obtained from the open drains and waterways within and downstream of the GCA reported detectable concentrations of PFAS. PFAS was not detected in the one sediment sample obtained upstream of the GCA (SW17-08). The sediment samples collected from within and downstream of the GCA exceeded the adopted human health sediment criterion for fish consumption.

The results indicate that PFAS is present at the eastern boundary of the GCA and immediately off site to the east - in groundwater, surface water and sediment. Concentrations of PFAS were reported at levels above the nominated investigation levels at some locations. This indicates that further assessment is required to determine if concentrations present a risk to human health and ecological sensitive receptors.

A preliminary, qualitative human health risk assessment has been undertaken based on the results of the spear pump sampling. The human health risk assessment (included as Appendix K) concluded that the health risk associated with the use of groundwater extracted for irrigation use is low and acceptable.

7. 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
- 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
- CRC CARE, 2017, Assessment, management and remediation for PFOS and PFOA, Part 3; Ecological screening levels
- Department of Environment and Conservation NSW, 2007: Guidelines for the Assessment and Management of Groundwater Contamination
- Department of Health (DoH), 2017, Health Based Guidance Values for PFAS for Use in Site Investigations in Australia
- Environment Protection Act 1970
- GHD, 2008: Airservices Australia – Report for ARFF National Testing Program Preliminary Site Contamination Assessment - Coolangatta ARFF Drill Ground, Gold Coast Airport
- GHD, 2015: Airservices Australia, Managing PFC Contamination at Airports, Interim Contamination Management Strategy and Decision Framework (GHD Reference 31322791239419)
- GHD Pty Ltd, 2016a: Airservices Australia – Gold Coast Airport Preliminary Site Investigation Report, October 2016
- GHD Pty Ltd, 2016b. Airservices Australia – Gold Coast Airport Preliminary Sampling Report, October 2016
- GHD, Pty Ltd, 2017a: Airservices Australia – Gold Coast Airport Biota Sampling Report, March 2017
- GHD Pty Ltd, 2017b: Airservices Australia – Stakeholder Contamination and Consultation Brief, May 2017
- GHD Pty Ltd, 2017c: Airservices Australia – ASA Gold Coast Further Groundwater Investigation Sampling Analysis and Quality Plan, June 2017
- GHD Pty Ltd, 2017d: Airservices Australia – Derivation of PFAS soil and water criteria, July 2017
- NEPC, 2013: National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (the ASC NEPM)

Appendices

Appendix A – Figures

Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2017.
 In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
 © The State of Queensland (Department of Natural Resources and Mines) 2017.



1:15,000 (at A4)
 0 100 200 300 400 500 600
 metres

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



NOTE

- Sample locations are indicative only and may vary depending on local conditions and features.
- ** Not sampled



Airservices Australia,
 Gold Coast Airport, Coolangatta, QLD, 4225

Job Number 41-30859
 Revision E
 Date 18 Oct 2017

Further Groundwater Investigations Investigation Locations

Figure 1

Appendix B – Spear pump, surface water and sediment sampling notes



Groundwater spear pump samples

Site: Gold Coast Airport

Field Measurements

Sample ID	Time/ date	Time	DO (mg/L)	EC (µS/cm)	pH	Redox (ORP or mV)	Temp (°C)	Turbidity (ntu)	Comments
SP1	24/07/2017	9:40am	5.1	101.8	5.96	76	22.3	-	Collected sample from hose following owner turning on tap Used regularly Water was clear with a slight yellow tinge Water has a very slight sulphur odour
SP2	24/07/2017	10:00am	5.68	322.1	5.88	119	21.7	-	Collected sample from hose following owner turning on tap Used regularly Re-installed 3 times in 32yrs Approximately 14 feet deep Water was clear with no odour or colour
SP3/QA1	24/07/2017	10:15am	5.37	212.5	6.19	71	22.5	-	Collected sample from hose following owner turning on tap Used regularly - set up to backyard irrigation Water was yellow with a medium sulphur odour
SP4	24/07/2017	2:00pm	1.42	135.2	5.92	17	22.5	4.4	Collected sample from hose following owner turning on tap Approximately 14 feet deep Water has a slight yellow colour
SP5	25/07/2017	9.30am	4.16	150.9	6.03	93	20.7	27.6	Sampled from a tap Water is clear, low turbidity, no odour Resident advised the water is used for watering the garden and fruit and vegetable trees Resident advised the spear pump was approximately 4 years old and 6 m deep. There was another spear at the property prior to this being installed.
SP5_tank	25/07/2017	9.30am	4.16	150.9	6.03	93	20.7	27.6	Sampled from a tap which has gone through a filtration system. Water is clear, low turbidity, no odours
SP6	27/07/2017	9.30am	4	217.4	6.15	-11	-	1	Sampled from tap Water is clear, low turbidity, no odour Resident advised the pump had been in place for 30+ years Water is used to irrigate the garden (mostly the lawn)
SP7	27/07/2017	10.05am	7.37	91.2	6.7	4	20.8	3.1	Sampled from tap Water is clear, low turbidity, no odour
SP8 / QA2	27/07/2017	10.25am	7.23	112.8	6.27	270	17.7	1.6	Split sample taken (QA2) Water is white / cloudy, no odour Sampled from tap No resident home but water appears to be used for watering lawn and garden (hose with sprinkler next to pump)
SP9	27/07/2017	10.50am	2.76	226.3	5.95	-69	20.7	24.2	Sampled from tap. Water is pale orange brown, low turbidity, minor hydrogen sulfide odour
SP10	27/07/2017	11.20am	3.79	86.8	5.98	114	20.8	5.7	Sampled from tap Water is clear, low turbidity, no odour
SP11	27/07/2017	11.45am	5.8	121.2	5.87	146	19	2.6	Sampled from hose as no access to the tap. The pump is plumbed in and comes out of the shed in the sink. Water is clear, low turbidity, no odour
SP12	27/07/2017	3.30pm	2.67	157.4	5.38	168	22.4	15.6	Water is clear, low turbidity, no odour Resident advised spear has been in place for a number of years and is used to water lawns Water sampled from tap
SP13	27/07/2017	3.50pm	4.19	120.1	6.03	115	21.6	8.4	Water is clear, low turbidity, no odour Water sampled from tap Pump has been in operation for 20-30 years. Water is used on gardens and for washing cars etc.
SP14	28/07/2017	2.00pm	5.82	78.4	6.02	154	20.8	1.9	Sampled from pump Water is used for irrigating grass Water is clear, low turbidity, no odour



Groundwater spear pump samples

Site: Gold Coast Airport

Field Measurements

Sample ID	Time/ date	Time	DO (mg/L)	EC (µS/cm)	pH	Redox (ORP or mV)	Temp (°C)	Turbidity (ntu)	Comments)
SP14H	28/07/2017	2.00pm	5.82	78.4	6.02	154	20.8	1.9	Sampled from hose Water is used for irrigating grass Water is clear, low turbidity, no odour
SP15	28/07/2017	2.30pm	3.06	91.5	5.64	137	21.9	4.5	Taken from spear which is 8 years old, 15 foot deep and used for irrigation (garden and patio) Water is clear, low turbidity, no odour
SP15a	28/07/2017	2.30pm	1.5	193.6	5.64	86	22	4.5	Taken from spear which is 15 years old, 15 foot deep and used for irrigation (garden and patio) Water is clear, low turbidity, minor hydrogen sulfide odour
SP16	10/08/2017	2.00pm	8.3	243	7.91	112	23.2	-	Sampled from tap on pump Water is clear, low turbidity, no odour
SP17	10/08/2017	2.30pm	5.99	121.9	6.33	61	22.9	-	Sampled from tap on pump Water is clear, low turbidity, no odour
SP18	23/08/2017	9:30am	-	-	-	-	-	-	The spear pump is used daily to water the grass Water was cloudy due to pump aeration, very slight sulphur odour No field readings recorded



Surface water samples

Site: Gold Coast Airport

Date: 10/08/2017

Field Measurements

Location	Time/ date	Sample ID	DO (mg/L)	EC (μ S/cm)	pH	Redox (ORP or mV)	Temp (°C)	Comments
SW16-01A	10/08/2017	SW16-01A	8.35	0.425	7.05	200	15.3	Clear, low turbidity, no odour
SW16-02A	10/08/2017	SW16-02A	7.55	1.137	6.78	83	15.6	Clear, low turbidity, no odour
SW16-03A	10/08/2017	SW16-03A	7.95	1.069	6.85	177	17.2	Clear, low turbidity, no odour
SW17-01	10/08/2017	SW17-01	5.54	1.17	7.52	39	18.5	Pale brown, low turbidity, no odour
SW17-02	10/08/2017	SW17-02	9.36	2.61	7.4	171	19.1	Pale brown, low turbidity, no odour
SW17-03	10/08/2017	SW17-03	11.02	14.09	7.03	102	21.4	Pale brown, low turbidity, no odour
SW17-04	10/08/2017	SW17-04	7.05	10.58	7.25	116	21.3	Orange brown, low turbidity, no odour
SW17-05	No sample collected as no access to drainage channel at this location (it is underground)							
SW17-06	10/08/2017	SW17-06	6.9	13.77	7.69	192	20.8	Orange brown, low turbidity, no odour
SW17-07	10/08/2017	SW17-07	3.87	4.13	7.1	33	19.3	Dark orange / brown, low turbidity, no odour
SW17-08	10/08/2017	SW17-08	7.78	0.508	6.53	41	14.2	Brown, medium turbidity, no odour



Sediment samples

Site: Gold Coast Airport

Field Observations

Location	Time/ date	Comments
SED16-01A	10-Aug-17	SAND, fine grained, brown, with some organic matter (algae), no odours or staining
SED16-02A	10-Aug-17	Silty SAND, fine grained, brown, no odours or staining
SED16-03A	10-Aug-17	SAND, fine grained, brown, with some gravels up to 20mm in diameter and traces of organic matter (algae)
SED17-01	10-Aug-17	Silty SAND, fine grained, dark brown, no odours or staining
SED17-02		Not sampled - no sediment at this location (newly constructed rock drainage channel)
SED17-03	10-Aug-17	SAND, fine grained, pale brown, no odours or staining
SED17-04	10-Aug-17	Silty SAND, fine grained, dark brown, no odours or staining
SED17-05		Not sampled - no access to drainage channel at this location (it is underground)
SED17-06	10-Aug-17	SAND, pale brown, no odours or staining
SED17-07	10-Aug-17	Silty SAND, fine grained, dark brown, traces of clay, no odours or staining
SED17-08	10-Aug-17	Gravelly SAND, fine grained, brown, no odours or staining

Appendix C – Groundwater well construction logs



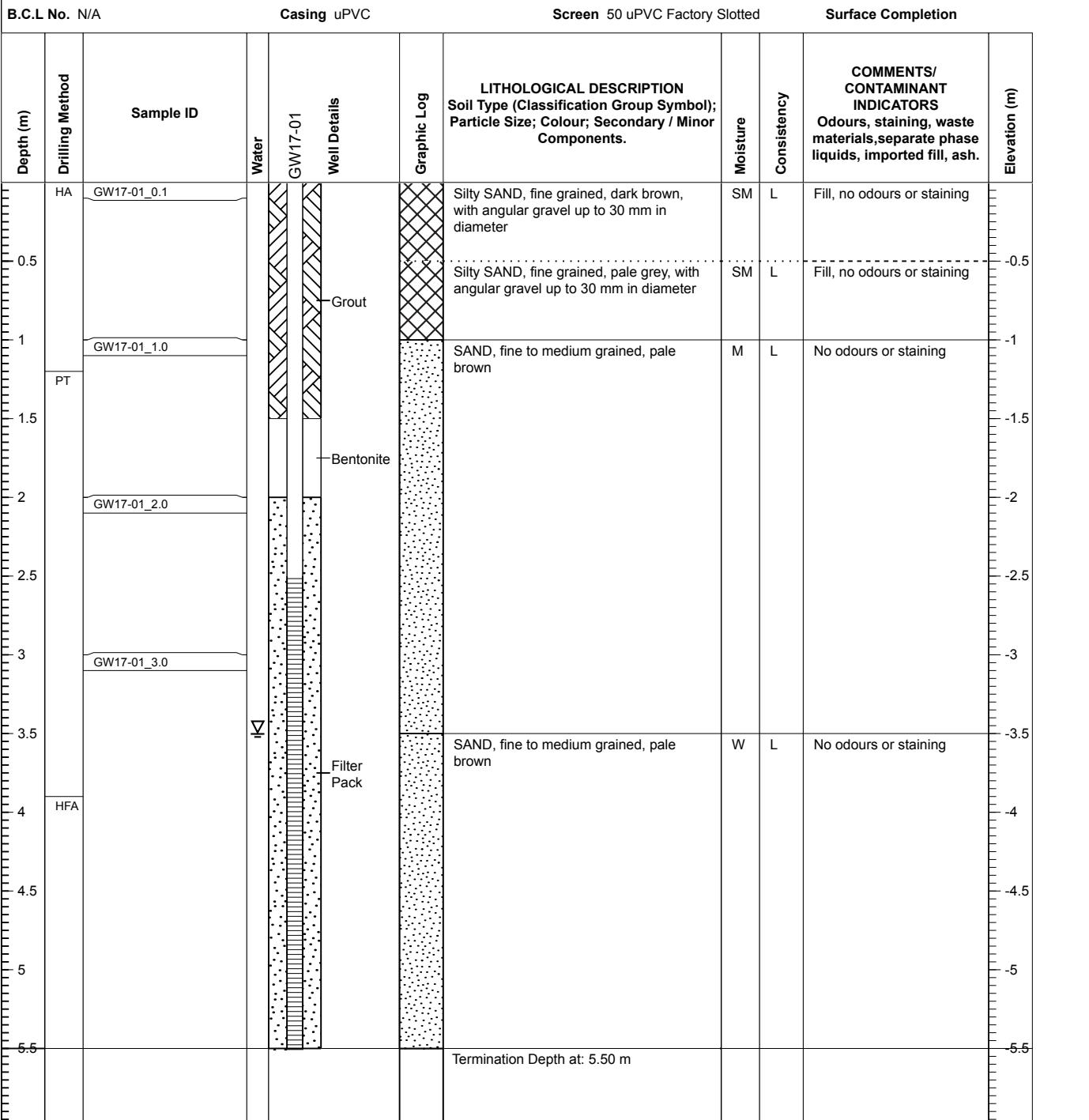
BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW17-01

Page 1 of 1

Client Airservices Australia	Drill Co. Numac	Easting, Northing 550260.78, 6884711.81
Project ASA Gold Coast Further Groundwater Investigation	Driller M. Hopkins	Grid Ref Elevation 4.96 (TOC)
Project No. 4130859	Rig Type 7822DT	Collar RL -Logged By AH
Site Gold Coast Airport	Drill Method Hollow Auger	Checked By - IB
Location Eastern Avenue Employee Car Park, Bilinga, QLD	Total Depth (m) 5.5	
Date Drilled 23/08/2017 - 23/08/2017	Diameter (mm) 180	



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



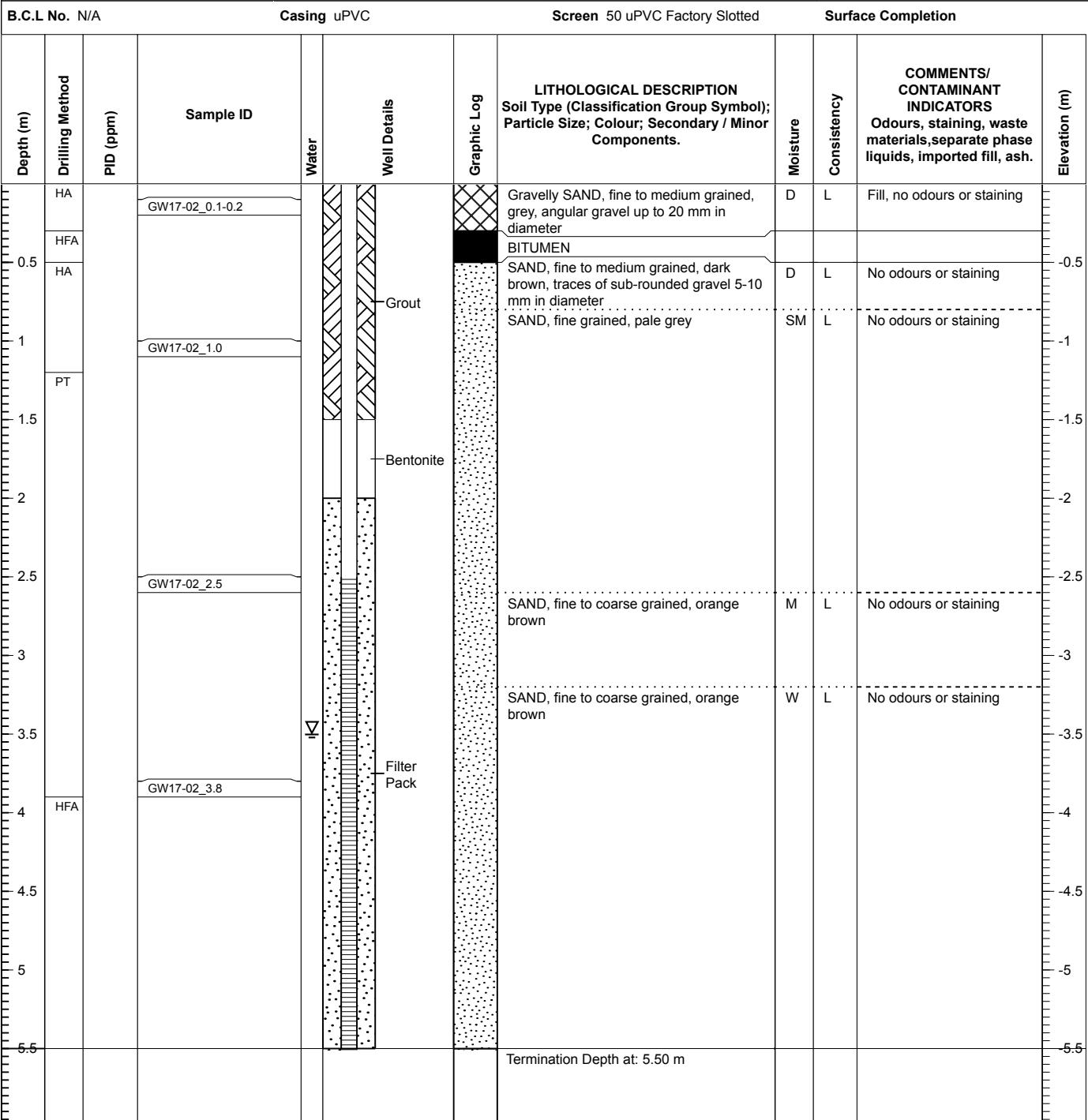
BOREHOLE LOG

MONITORING WELL GW17-02

ENVIRONMENTAL-GROUNDWATER

Page 1 of 1

Client Airservices Australia	Drill Co. Numac	Easting, Northing 550278.775, 6884650.895
Project ASA Gold Coast Further Groundwater Investigation	Driller M. Hopkins	Grid Ref Elevation 4.77 (TOC)
Project No. 4130859	Rig Type 7822DT	Collar RL -Logged By AH
Site Gold Coast Airport	Drill Method Hollow Auger	Checked By - IB
Location Eastern Avenue Employee Car Park, Bilinga, QLD	Total Depth (m) 5.5	
Date Drilled 23/08/2017 - 23/08/2017	Diameter (mm) 180	



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 D – Groundwater well survey data

Gold Coast Airport, Monitors				
Easting MGA94	Northing MGA94	Top of Cap	Top of Monitor	Description
550260.78	6884711.81	4.96	4.801	GW17-01
550278.775	6884650.895	4.77	4.672	GW17-02
550201.36	6884652.13	4.43	4.345	MW-X01
Date - 11th September 2017				

Appendix E – Groundwater gauging and sampling records

GROUNDWATER PURGING AND SAMPLING FIELD SHEET



Project Number: 4130859	
Project Name: ASA Gold Coast Further Groundwater Investigation	Sample ID: GW16-01
Client: ASA	Date: 30/8/2017 Time:10AM
Site: Gold Coast Airport	Sampler: A.H.
Well Condition (i.e road box, locked etc): locked gatic	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 3.365	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 5.10	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 3.39	QA Collected: -

FIELD PARAMETERS (RECORDED USING TPS 90FLMV Water Quality Meter)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET



PROJECT DETAILS	
Project Number:	4130859
Project Name:	ASA Gold Coast Further Groundwater Investigation
Client:	ASA
Site:	Gold Coast Airport
Well Condition (i.e road box, locked etc):	locked gatic
Depth to Water Table Pre-purge (from TOC):	3.77
Depth of PSH (from TOC):	-
Depth to Bottom of Casing (BOC) from TOC:	5.10
Casing Stickup:	Gatic
Depth to Water Table Post - purge (from TOC):	3.80
Borehole ID: GW16-02	
Sample ID: GW16-02	
Date:	30/8/2017 Time:11:10AM
Sampler: A.H.	
Purge Method:	Low Flow
Sample Method:	Low Flow
Casing Type:	uPVC Class 18
Well Diameter:	50 mm
Calculated Bore Volume(L): -	
QA Collected: GW-QA1 and GW-QA2	

FIELD PARAMETERS (RECORDED USING TPS 90FLMV Water Quality Meter)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET



PROJECT DETAILS	Borehole ID: GW16-03
Project Number: 4130859	
Project Name: ASA Gold Coast Further Groundwater Investigation	Sample ID: GW16-03
Client: ASA	Date: 30/8/2017 Time: 2:30PM
Site: Gold Coast Airport	Sampler: A.H.
Well Condition (i.e road box, locked gatic	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 3.89	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 5.10	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 3.90	QA Collected: -

FIELD PARAMETERS (RECORDED USING TPS 90FLMV Water Quality Meter)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET



GROUNDWATER PURGING AND SAMPLING FIELD SHEET



PROJECT DETAILS	
Project Number:	4130859
Project Name:	ASA Gold Coast Further Groundwater Investigation
Client:	ASA
Site:	Gold Coast Airport
Well Condition (i.e road box, locked etc):	locked gatic
Depth to Water Table Pre-purge (from TOC):	2.915
Depth of PSH (from TOC):	-
Depth to Bottom of Casing (BOC) from TOC:	5.55
Casing Stickup:	Gatic
Depth to Water Table Post - purge (from TOC):	2.92
Borehole ID: GW17-02	
Sample ID: GW17-02	
Date:	30/8/2017 Time: 3:10PM
Sampler: A.H.	
Purge Method:	Low Flow
Sample Method:	Low Flow
Casing Type:	uPVC Class 18
Well Diameter:	50 mm
Calculated Bore Volume(L): -	
QA Collected: -	

FIELD PARAMETERS (RECORDED USING TPS 90FLMV Water Quality Meter)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET



PROJECT DETAILS	
Project Number:	4130859
Project Name:	ASA Gold Coast Further Groundwater Investigation
Client:	ASA
Site:	Gold Coast Airport
Well Condition (i.e road box, locked etc):	Gatic
Depth to Water Table Pre-purge (from TOC):	2.55
Depth of PSH (from TOC):	-
Depth to Bottom of Casing (BOC) from TOC:	4.92
Casing Stickup:	Gatic
Depth to Water Table Post - purge (from TOC):	2.57
Borehole ID: MWX-01	
	MWX-01
	Date: 30/8/2017 Time: 3:10PM
	Sampler: A.H.
	Purge Method: Low Flow
	Sample Method: Low Flow
	Casing Type: uPVC Class 18
	Well Diameter: 50 mm
	Calculated Bore Volume(L): -
	QA Collected: -

FIELD PARAMETERS (RECORDED USING TPS 90FLMV Water Quality Meter)

Appendix F – Tabulated results



Appendix F

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Appendix F
Table F1 Spear pump groundwater results

	Analytical Data (µg/L)												Acidity & Alkalinity				Major Ions							
	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluoroheptanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorooctanoic acid	Perfluorotetradecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total) (MA DER List)	Alkalinity (Carbonate as CaCO ₃)	Alkalinity (Hydroxide as CaCO ₃)	Alkalinity (total as CaCO ₃)	Bicarbonate Alkalinity as CaCO ₃	Sulfate as SO ₄ - Turbidimetric (Filtered)	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Potassium (Filtered)	Sodium (Filtered)	Cations Total	
EQL	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.002	0.002	1	1	1	1	1	1	1	1	0.01	1	1	0.01	
FSANZ - PFAS Drinking water quality guideline																								
FSANZ - PFAS Recreational water quality guideline																								

Site_ID	Location_Code	Sampled_Date_Time	Analytical Data (µg/L)																							
Gold Coast Airport	SP1	24/07/2017	<0.002	<0.002	<0.002	0.004	<0.002	0.088	<0.002	<0.005	<0.002	<0.002	0.161	0.069	<1	<1	17	17	5	6	13	2	0.81	1	9	0.88
Gold Coast Airport	SP2	24/07/2017	<0.002	<0.002	<0.002	0.002	0.114	<0.002	<0.005	<0.002	<0.002	<0.002	0.165	0.044	<1	<1	7	7	19	11	28	2	1.32	1	24	1.78
Gold Coast Airport	SP3	24/07/2017	<0.002	<0.002	<0.002	<0.002	0.007	<0.002	<0.005	<0.002	<0.002	<0.002	0.016	0.009	<1	<1	22	22	4	6	48	2	1.88	2	28	1.73
Gold Coast Airport	SP4	24/07/2017	<0.002	<0.002	<0.002	0.007	<0.002	0.069	<0.002	<0.005	<0.002	<0.002	0.153	0.079	<1	<1	16	16	2	5	22	2	0.98	<1	12	0.94
Gold Coast Airport	SP5	24/07/2017	<0.002	<0.002	<0.002	0.004	<0.002	0.035	<0.002	<0.005	<0.002	<0.002	0.088	0.053	<1	<1	14	14	15	8	44	2	1.83	1	13	1.15
Gold Coast Airport	SP5_tank	25/07/2017	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.02	0.05	0.05	-	-	-	-	-	-	-	-	-	-	-	-
Gold Coast Airport	SP6	27/07/2017	<0.002	<0.002	0.002	0.004	<0.002	0.027	<0.002	<0.005	<0.002	<0.002	0.077	0.05	<1	<1	15	15	3	8	44	3	1.6	3	24	1.77
Gold Coast Airport	SP7	27/07/2017	<0.002	<0.002	0.002	0.006	<0.002	0.105	<0.002	<0.005	<0.002	<0.002	0.183	0.074	<1	<1	18	18	11	8	13	2	0.96	2	10	1.05
Gold Coast Airport	SP8	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.01	<0.002	<0.005	<0.002	<0.002	<0.002	0.031	0.021	<1	<1	21	21	7	4	16	<1	1.02	<1	16	0.9
Gold Coast Airport	SP9	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.033	<0.002	<0.005	<0.002	<0.002	<0.002	0.05	0.017	<1	<1	16	16	4	5	50	4	1.81	1	30	1.91
Gold Coast Airport	SP10	27/07/2017	<0.002	<0.002	0.002	0.004	<0.002	0.027	<0.002	<0.005	<0.002	<0.002	0.062	0.035	<1	<1	7	7	8	6	12	<1	0.64	<1	9	0.69
Gold Coast Airport	SP11	27/07/2017	<0.002	<0.002	0.004	0.004	<0.002	0.015	<0.002	<0.005	<0.002	<0.002	0.049	0.034	<1	<1	7	7	14	6	16	2	0.88	2	12	1.04
Gold Coast Airport	SP12	27/07/2017	<0.002	<0.002	<0.002	0.002	<0.002	0.012	<0.002	<0.005	<0.002	<0.002	0.033	0.021	<1	<1	2	2	20	8	20	2	1.02	2	13	1.18
Gold Coast Airport	SP13	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.008	<0.002	<0.005	<0.002	<0.002	<0.002	0.018	0.01	<1	<1	16	16	10	6	16	2	0.98	1	13	1.06
Gold Coast Airport	SP14	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.025	<0.002	<0.005	<0.002	<0.002	<0.002	0.038	0.013	<1	<1	7	7	5	6	14	1	0.64	<1	7	0.69
Gold Coast Airport	SP14H	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.026	<0.002	<0.005	<0.002	<0.002	<0.002	0.037	0.011	<1	<1	8	8	5	6	14	1	0.66	<1	8	0.73
Gold Coast Airport	SP15	28/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gold Coast Airport	SP15a	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.011	<0.002	<0.005	<0.002	<0.002	0.02	0.009	<1	<1	5	5	14	6	43	2	1.6	<1	27	1.64	
Gold Coast Airport	SP16	10/08/2017	<0.002	<0.002	<0.002	0.002	<0.002	0.005	<0.002	<0.005	<0.002	<0.002	0.009	0.004	<1	<1	4	4	4	7	9	<1	0.42	<1	6	0.61
Gold Coast Airport	SP17	10/08/2017	<0.002	<0.002	<0.002	0.009	<0.002	0.026	<0.002	<0.005	<0.002	<0.002	0.127	0.101	<1	<1	12	12	8	6	20	1	0.97	<1	13	0.95
Gold Coast Airport	SP18	23/08/2017	<0.002	<0.002	<0.002	0.003	<0.002	0.002	<0.002	<0.005	<0.002	<0.002	0.022	0.02	<1	<1	11	11	43	12	47	5	2.44	5	30	2.44

Appendix F
Table F2 Groundwater monitoring well results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

	Field Parameters				Field	Inorganics		PFAS																				
	[DO (mg/L) [Field]	Electrical conductivity [field]	pH [Field]	Redox [Field]		[Temperature [Field]	Purge SWL	Total Dissolved Solids (Filtered)	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane 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-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (FOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid			
	mg/L	µS/cm	pH Units	mV	mbtoc	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		
EQL						10	0.02	0.02	0.02	0.05	0.05	0.02	0.01	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1		
FSANZ - PFAS Drinking water quality guideline															0.07											0.56		
FSANZ - PFAS Recreational water quality guideline															0.7												5.6	

Site_ID	Location_Code	Sampled_Date_Time	1.31	119	6.29	-10	23	3.39	91	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1
Gold Coast Airport	GW16-01	30/08/2017	1.31	119	6.29	-10	23	3.39	91	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1
Gold Coast Airport	GW16-02	30/08/2017	1.4	78.9	5.61	-45	21.8	3.8	60	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.07	<0.02	0.04	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	
Gold Coast Airport	GW16-03	30/08/2017	5.85	105.3	5.01	177	22.5	3.9	79	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.07	<0.02	0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1
Gold Coast Airport	GW17-01	30/08/2017	0.9	75.7	6.11	-120	25.3	3.09	72	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	1.18	<0.02	0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.02	0.2	
Gold Coast Airport	GW17-02	30/08/2017	0.68	195.1	5.68	-118	24.3	2.92	131	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.6	0.02	0.17	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	0.02	<0.1		
Gold Coast Airport	MWX01	30/08/2017	1.12	212	5.94	98	25	2.57	138	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	2.68	0.02	1.12	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	0.04	<0.1		

Appendix F
Table F2 Groundwater monitoring well results

	Analytical Data Summary																		Chemical Properties & Major Ions											
	Perfluorocarboxylic acids						Perfluorooctane sulfonic acid (POS)						PFAS (Sum of Total) (WA DER List)						Acidity & Alkalinity					Major Ions						
	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (POS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	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							
EQL	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.01	0.01	1	1	1	1	1	1	1	1	0.01	1	1	0.01						
FSANZ - PFAS Drinking water quality guideline																														
FSANZ - PFAS Recreational water quality guideline																														
Site_ID	Location_Code	Sampled_Date_Time	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	31	31	5	11	19	1	1.26	1	10	1.09			
Gold Coast Airport	GW16-01	30/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<1	<1	31	31	5	11	19	1	1.26	1	10	1.09			
Gold Coast Airport	GW16-02	30/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.07	0.07	<1	<1	11	11	6	4	14	2	0.74	<1	9	0.76			
Gold Coast Airport	GW16-03	30/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.07	0.07	<1	<1	4	4	5	4	18	2	0.69	<1	12	0.89				
Gold Coast Airport	GW17-01	30/08/2017	<0.02	<0.02	<0.02	<0.02	<0.02	1.13	<0.02	<0.05	<0.02	<0.02	1.4	1.4	<1	<1	31	31	4	9	7	1	0.9	<1	5	0.75				
Gold Coast Airport	GW17-02	30/08/2017	<0.02	<0.02	<0.02	0.03	<0.02	0.43	<0.02	<0.05	<0.02	<0.02	0.68	0.66	<1	<1	27	27	34	13	19	4	1.78	2	15	1.68				
Gold Coast Airport	MWX01	30/08/2017	<0.02	<0.02	<0.02	0.08	<0.02	1.56	<0.02	<0.05	<0.02	<0.02	2.85	2.81	<1	<1	38	38	38	21	14	3	1.94	2	13	1.91				

Appendix F
Table F3 Surface water results
Adopted human health screening levels

	Field Parameters					Inorganics												PFAS											
	DO (mg/L) (Field)		Electrical conductivity (field)			Inorganics												PFAS											
	mg/L	µS/cm	pH (Field)	mV	Redox (Field)	Temperature (Field)	Total Dissolved Solids (Filtered)												PFAS										
	mg/L	µS/cm	pH Units	mV	Redox (Field)	Temperature (Field)	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L												
EQL							10	0.002	0.002	0.002	0.005	0.005	0.002	0.002	0.002	0.002	0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.002	0.002	0.01			
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	
FSANZ - PFAS Recreational water quality guideline																		0.7											5.6

Site_ID	Location_Code	Sampled_Date_Time	8.35	425	7.05	200	15.3	253	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.085	0.003	0.04	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	0.006	<0.01
Gold Coast Airport	SW16-01A	10/08/2017	7.55	1137	6.78	83	15.6	608	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	3.34	0.1	1.22	0.04	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.027	0.223	<0.01
Gold Coast Airport	SW16-02A	10/08/2017	7.95	1069	6.85	177	17.2	630	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	3.1	0.091	1.19	0.035	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.02	0.215	<0.01
Gold Coast Airport	SW16-03A	10/08/2017	5.54	1170	7.52	39	18.5	675	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	1.59	0.07	0.918	0.028	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.017	0.184	<0.01
Gold Coast Airport	SW17-01	10/08/2017	9.36	2610	7.4	171	19.1	1560	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	1.45	0.053	0.643	0.021	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.015	0.123	<0.01
Gold Coast Airport	SW17-02	10/08/2017	11.02	14,090	7.03	102	21.4	8860	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	1.18	0.042	0.538	0.016	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	0.102	<0.01
Gold Coast Airport	SW17-03	10/08/2017	7.05	10,580	7.25	116	21.3	7260	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.605	0.029	0.357	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.069	<0.01
Gold Coast Airport	SW17-04	10/08/2017	6.9	13,770	7.69	192	20.8	9750	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.423	0.018	0.236	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.039	<0.01
Gold Coast Airport	SW17-05	10/08/2017	3.87	4130	7.1	33	19.3	2360	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.02	0.003	0.006	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.01	
Gold Coast Airport	SW17-06	10/08/2017	7.78	508	6.53	41	14.2	309	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.086	0.003	0.056	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	0.007	<0.01	
Gold Coast Airport	SW17-07	10/08/2017																									
Gold Coast Airport	SW17-08	10/08/2017																									

													Acidity & Alkalinity		Major Ions								
	Perfluorodecanoic acid μg/L	Perfluorododecanoic acid μg/L	Perfluoroheptanoic acid μg/L	Perfluorohexanoic acid (PFHxA) μg/L	Perfluorononanoic acid μg/L	Perfluorooctane sulfonic acid (PFOS) μg/L	Perfluorooctane sulfonamide (FOSA) μg/L	Perfluorooctane sulfonate μg/L	Perfluorotetradecanoic acid μg/L	Perfluorotridecanoic acid μg/L	Perfluoroundecanoic acid μg/L	PFAS (Sum of Total) μg/L	PFAS (Sum of Total)(WA DER List) mg/L	Alkalinity (Carbonate as CaCO ₃) mg/L	Alkalinity (Hydroxide as CaCO ₃) mg/L	Alkalinity (total as CaCO ₃) mg/L	Sulfate as SO ₄ - Turbidimetric (filtered) mg/L	Chloride mg/L	Magnesium (Filtered) mg/L	Anions Total meq/L	Potassium (Filtered) mg/L	Sodium (Filtered) mg/L	Cations Total meq/L
EQL	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.002	0.002	0.002	1	1	1	1	1	1	0.01	1	1	0.01	0.01
Airservices - GHD 2017 Human Health Criteria - FW Fish Consumption																							
Airservices - GHD 2017 Human Health Criteria - MW Fish Consumption																							
FSANZ - PFAS Recreational water quality guideline																							

Site_ID Location_Code Sampled_Date_Time

Gold Coast Airport	SW16-01A	10/08/2017	<0.002	<0.002	<0.002	0.009	<0.002	0.045	<0.002	<0.005	<0.002	<0.002	0.105	0.06	<1	<1	68	68	23	23	66	3.7	2	49	3.82	1.66	
Gold Coast Airport	SW16-02A	10/08/2017	<0.002	<0.002	0.015	0.333	0.002	2.12	<0.002	<0.005	<0.002	<0.002	4.08	1.96	<1	<1	68	68	42	28	301	21	10.7	7	172	10.8	0.29
Gold Coast Airport	SW16-03A	10/08/2017	<0.002	0.002	0.013	0.268	0.003	1.91	<0.002	<0.005	<0.002	<0.002	3.75	1.83	<1	<1	62	62	44	25	320	20	11.2	7	162	10.1	4.99
Gold Coast Airport	SW17-01	10/08/2017	<0.002	<0.002	0.011	0.189	0.002	0.67	<0.002	<0.005	<0.002	<0.002	2.09	1.42	<1	<1	62	62	44	25	327	22	11.4	7	175	10.8	2.38
Gold Coast Airport	SW17-02	10/08/2017	<0.002	<0.002	0.009	0.134	0.002	0.808	<0.002	<0.005	<0.002	<0.002	1.81	0.998	<1	<1	68	68	107	35	789	53	25.8	18	451	26.2	0.66
Gold Coast Airport	SW17-03	10/08/2017	<0.002	<0.002	0.006	0.102	<0.002	0.64	<0.002	<0.005	<0.002	<0.002	1.46	0.817	<1	<1	65	65	610	108	4650	298	145	96	2620	146	0.4
Gold Coast Airport	SW17-04	10/08/2017	<0.002	<0.002	0.005	0.077	<0.002	0.248	<0.002	<0.005	<0.002	<0.002	0.805	0.557	<1	<1	87	87	493	88	3780	235	119	78	2090	117	0.85
Gold Coast Airport	SW17-06	10/08/2017	<0.002	<0.002	0.003	0.049	<0.002	0.187	<0.002	<0.005	<0.002	<0.002	0.546	0.359	<1	<1	116	116	638	108	4940	304	155	100	2700	150	1.49
Gold Coast Airport	SW17-07	10/08/2017	<0.002	<0.002	<0.002	0.005	<0.002	0.014	<0.002	<0.005	<0.002	<0.002	0.028	0.014	<1	<1	157	157	153	33	1040	65	35.6	28	719	39	4.46
Gold Coast Airport	SW17-08	10/08/2017	<0.002	<0.002	<0.002	0.009	<0.002	0.03	<0.002	<0.005	<0.002	<0.002	0.105	0.075	<1	<1	134	134	13	48	57	7	4.56	4	36	4.64	0.91



Appendix F

Table F4 Surface water results Adopted ecological screening levels

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Site_ID	Location_Code	Sampled_Date_Time																				
Gold Coast Airport	SW16-01A	10/08/2017		8.35	425	7.05	200	15.3	253	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.085	0.003	0.04	<0.002	<0.005	<0.005	<0.005
Gold Coast Airport	SW16-02A	10/08/2017		7.55	1137	6.78	83	15.6	608	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	3.34	0.1	1.22	0.04	<0.005	<0.005	<0.005
Gold Coast Airport	SW16-03A	10/08/2017		7.95	1069	6.85	177	17.2	630	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	3.1	0.091	1.19	0.035	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-01	10/08/2017		5.54	1170	7.52	39	18.5	675	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	1.59	0.07	0.918	0.028	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-02	10/08/2017		9.36	2610	7.4	171	19.1	1560	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	1.45	0.053	0.643	0.021	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-03	10/08/2017		11.02	14,090	7.03	102	21.4	8860	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	1.18	0.042	0.538	0.016	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-04	10/08/2017		7.05	10,580	7.25	116	21.3	7260	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.605	0.029	0.357	0.012	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-06	10/08/2017		6.9	13,770	7.69	192	20.8	9750	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.423	0.018	0.236	0.008	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-07	10/08/2017		3.87	4130	7.1	33	19.3	2360	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.02	0.003	0.006	<0.002	<0.005	<0.005	<0.005
Gold Coast Airport	SW17-08	10/08/2017		7.78	508	6.53	41	14.2	309	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.086	0.003	0.056	<0.002	<0.005	<0.005	<0.005

Appendix F
Table F4 Surface water results
Adopted ecological screening levels

Airservices Australia
 Gold Coast Airport
 ASA Further Groundwater Investigation

	PFAS															Ac
	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluoroheptanoic acid (PFHxA)	Perfloronanoic acid	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
EQL	0.005	0.005	0.005	0.002	0.002	0.01	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
CRC Care 2017 Tech Report 38 PFAS ESL Freshwater 95% Species Protection				220								0.13				
CRC Care 2017 Tech Report 38 PFAS ESL Marine 95% Species Protection				8500								7.8				
CRC Care 2017 Tech Report 38 PFAS ESL Marine 99% Species Protection				3000								0.29				

Site_ID	Location_Code	Sampled_Date_Time	<0.005	<0.005	<0.005	0.002	0.006	<0.01	<0.002	<0.002	<0.002	0.009	<0.002	0.045	<0.002	<0.005	<0.002	<0.002	0.105	0.06	<1
Gold Coast Airport	SW16-01A	10/08/2017	<0.005	<0.005	<0.005	0.002	0.006	<0.01	<0.002	<0.002	<0.002	0.009	<0.002	0.045	<0.002	<0.005	<0.002	<0.002	0.105	0.06	<1
Gold Coast Airport	SW16-02A	10/08/2017	<0.005	<0.005	<0.005	0.027	0.223	<0.01	<0.002	<0.002	0.015	0.333	0.002	2.12	<0.002	<0.005	<0.002	<0.002	4.08	1.96	<1
Gold Coast Airport	SW16-03A	10/08/2017	<0.005	<0.005	<0.005	0.02	0.215	<0.01	<0.002	0.002	0.013	0.268	0.003	1.91	<0.002	<0.005	<0.002	<0.002	3.75	1.83	<1
Gold Coast Airport	SW17-01	10/08/2017	<0.005	<0.005	<0.005	0.017	0.184	<0.01	<0.002	<0.002	0.011	0.189	0.002	0.67	<0.002	<0.005	<0.002	<0.002	2.09	1.42	<1
Gold Coast Airport	SW17-02	10/08/2017	<0.005	<0.005	<0.005	0.015	0.123	<0.01	<0.002	<0.002	0.009	0.134	0.002	0.808	<0.002	<0.005	<0.002	<0.002	1.81	0.998	<1
Gold Coast Airport	SW17-03	10/08/2017	<0.005	<0.005	<0.005	0.011	0.102	<0.01	<0.002	<0.002	0.006	0.102	<0.002	0.64	<0.002	<0.005	<0.002	<0.002	1.46	0.817	<1
Gold Coast Airport	SW17-04	10/08/2017	<0.005	<0.005	<0.005	0.008	0.069	<0.01	<0.002	<0.002	0.005	0.077	<0.002	0.248	<0.002	<0.005	<0.002	<0.002	0.805	0.557	<1
Gold Coast Airport	SW17-06	10/08/2017	<0.005	<0.005	<0.005	0.006	0.039	<0.01	<0.002	<0.002	0.003	0.049	<0.002	0.187	<0.002	<0.005	<0.002	<0.002	0.546	0.359	<1
Gold Coast Airport	SW17-07	10/08/2017	<0.005	<0.005	<0.005	<0.002	<0.002	<0.01	<0.002	<0.002	<0.002	0.005	<0.002	0.014	<0.002	<0.005	<0.002	<0.002	0.028	0.014	<1
Gold Coast Airport	SW17-08	10/08/2017	<0.005	<0.005	<0.005	<0.002	0.007	<0.01	<0.002	<0.002	<0.002	0.009	<0.002	0.03	<0.002	<0.005	<0.002	<0.002	0.105	0.075	<1

Appendix F
Table F4 Surface water results
Adopted ecological screening levels

	Acidity & Alkalinity			Major Ions									
	Alkalinity (Hydroxide as CaCO ₃) mg/L	Alkalinity (total as CaCO ₃) mg/L	Bicarbonate Alkalinity as CaCO ₃ mg/L	Sulfate as SO ₄ - Turbidimetric (Filtered) mg/L	Calcium (Filtered) mg/L	Chloride mg/L	Magnesium (Filtered) mg/L	Anions Total meq/L	Potassium (Filtered) mg/L	Sodium (Filtered) mg/L	Cations Total meq/L	Ionic Balance %	
EQL	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01	
CRC Care 2017 Tech Report 38 PFAS ESL Freshwater 95% Species Protection													
CRC Care 2017 Tech Report 38 PFAS ESL Marine 95% Species Protection													
CRC Care 2017 Tech Report 38 PFAS ESL Marine 99% Species Protection													

Site_ID	Location_Code	Sampled_Date_Time	<1	68	68	23	23	66	6	3.7	2	49	3.82	1.66
Gold Coast Airport	SW16-01A	10/08/2017	<1	68	68	42	28	301	21	10.7	7	172	10.8	0.29
Gold Coast Airport	SW16-02A	10/08/2017	<1	68	68	44	25	320	20	11.2	7	162	10.1	4.99
Gold Coast Airport	SW16-03A	10/08/2017	<1	62	62	44	25	327	22	11.4	7	175	10.8	2.38
Gold Coast Airport	SW17-01	10/08/2017	<1	62	62	44	25	789	53	25.8	18	451	26.2	0.66
Gold Coast Airport	SW17-02	10/08/2017	<1	68	68	107	35	610	108	4650	298	145	96	2620
Gold Coast Airport	SW17-03	10/08/2017	<1	65	65	610	108	4650	298	145	96	2620	146	0.4
Gold Coast Airport	SW17-04	10/08/2017	<1	87	87	493	88	3780	235	119	78	2090	117	0.85
Gold Coast Airport	SW17-06	10/08/2017	<1	116	116	638	108	4940	304	155	100	2700	150	1.49
Gold Coast Airport	SW17-07	10/08/2017	<1	157	157	153	33	1040	65	35.6	28	719	39	4.46
Gold Coast Airport	SW17-08	10/08/2017	<1	134	134	13	48	57	7	4.56	4	36	4.64	0.91

Appendix F
Table F5 Sediment results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

	Inorganic														PFAS			
	%	mg/kg	mg/kg															
EQL	1	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	
Airservices -GHD 2017 Human Health Criteria - SC Fish							0.0002										0.0018	

Site_ID	Location_Code	Sampled_Date_Time	37.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0008	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED16-01A	10/08/2017	37.1	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0008	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED16-02A	10/08/2017	33.5	<0.0002	<0.0002	0.001	<0.0005	<0.0005	<0.0002	0.194	<0.0002	0.0065	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0012
Gold Coast Airport	SED16-03A	10/08/2017	35.2	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED17-01	10/08/2017	70.4	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0415	<0.0002	0.0054	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	0.0005
Gold Coast Airport	SED17-03	10/08/2017	41.6	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0011	<0.0002	0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED17-04	10/08/2017	46.7	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0015	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED17-06	10/08/2017	28.3	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0024	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED17-07	10/08/2017	51.8	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	0.0011	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Gold Coast Airport	SED17-08	10/08/2017	26.6	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002

Appendix F
Table F5 Sediment results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Site ID	Location Code	Sampled Date Time	PFAS (Sum of Total)(WA DER List)													
			Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluoroctane sulfonic acid (FOOS)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002
Airservices -GHD 2017 Human Health Criteria - SC Fish																

Site_ID	Location_Code	Sampled_Date_Time	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Gold Coast Airport	SED16-01A	10/08/2017	<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	0.0008
Gold Coast Airport	SED16-02A	10/08/2017	0.0003	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	0.187	<0.0002	<0.0005	<0.0002	<0.0002	0.197
Gold Coast Airport	SED16-03A	10/08/2017	<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	0.0004
Gold Coast Airport	SED17-01	10/08/2017	<0.0002	<0.001	0.0002	0.0005	<0.0002	0.0006	<0.0002	0.0361	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	0.0433
Gold Coast Airport	SED17-03	10/08/2017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.0005	<0.0002	<0.0002	0.0011	0.0011
Gold Coast Airport	SED17-04	10/08/2017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0015	<0.0002	<0.0005	<0.0002	<0.0002	0.0015	0.0015
Gold Coast Airport	SED17-06	10/08/2017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0024	<0.0002	<0.0005	<0.0002	<0.0002	0.0024	0.0024
Gold Coast Airport	SED17-07	10/08/2017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	<0.0002	<0.0005	<0.0002	<0.0002	0.0011	0.0011
Gold Coast Airport	SED17-08	10/08/2017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002



Appendix F
Table F6 Rinsate blank results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Field ID Sampled_Date Sample Type	Rinsate 10/08/2017 Rinsate	GW-rinsate 30/08/2017 Rinsate	Drill_rinsate 23/08/2017 Rinsate
PFAS			
N-Ethyl perfluorooctane sulfonamidoacetic acid	µg/L 0.002	<0.002	<0.02
Perfluorodecanesulfonic acid (PFDS)	µg/L 0.002	<0.002	<0.02
Perfluoroheptane sulfonic acid	µg/L 0.002	<0.002	<0.02
10:2 Fluorotelomer sulfonic acid	µg/L 0.005	<0.005	<0.05
4:2 Fluorotelomer sulfonic acid	µg/L 0.005	<0.005	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid	µg/L 0.002	<0.002	<0.02
PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L 0.002	<0.002	<0.01
Perfluorobutane sulfonic acid	µg/L 0.002	<0.002	<0.02
Perfluorohexane sulfonic acid (PFHxS)	µg/L 0.002	<0.002	<0.02
Perfluoropentanoic acid	µg/L 0.002	<0.002	<0.02
8:2 Fluorotelomer sulfonic acid	µg/L 0.005	<0.005	<0.05
N-Ethyl perfluorooctane sulfonamide	µg/L 0.005	<0.005	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol	µg/L 0.005	<0.005	<0.05
N-Methyl perfluorooctane sulfonamide	µg/L 0.005	<0.005	<0.05
N-Methyl perfluorooctane sulfonamidoethanol	µg/L 0.005	<0.005	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L 0.005	<0.005	<0.05
Perfluorooctanoic acid (PFOA)	µg/L 0.002	<0.002	<0.01
Perfluoropentane sulfonic acid	µg/L 0.002	<0.002	<0.02
Perfluorobutanoic acid	µg/L 0.01	<0.01	<0.1
Perfluorodecanoic acid	µg/L 0.002	<0.002	<0.02
Perfluorododecanoic acid	µg/L 0.002	<0.002	<0.02
Perfluoroheptanoic acid	µg/L 0.002	<0.002	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L 0.002	<0.002	<0.02
Perfluorononanoic acid	µg/L 0.002	<0.002	<0.02
Perfluorooctane sulfonic acid (PFOS)	µg/L 0.002	<0.002	<0.01
Perfluorooctane sulfonamide (FOSA)	µg/L 0.002	<0.002	<0.02
Perfluorotetradecanoic acid	µg/L 0.005	<0.005	<0.05
Perfluorotridecanoic acid	µg/L 0.002	<0.002	<0.02
Perfluoroundecanoic acid	µg/L 0.002	<0.002	<0.02
PFAS (Sum of Total)	µg/L 0.002	<0.002	<0.01
PFAS (Sum of Total)(WA DER List)	µg/L 0.002	<0.002	<0.01



Appendix F
Table F7 Sediment QAQC results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Field Duplicates (Sediment)
Filter: SDG in('ALSE-Brisbane 31-Aug-17','ALSE-Brisbane 23-Aug-17','

SDG	ALSE-Brisbane 11-Aug-17	ALSE-Brisbane 11-Aug-17	RD	ALSE-Brisbane 11-Aug-17	14-Aug-17
Field ID	SED17-04	SED_QA1		SED17-04	SED_QA2
Sampled Date/Time	10/08/2017	10/08/2017	RPD	10/08/2017	RPD

Chem_Grc	ChemName	Units	EQL					
Inorganics	Moisture Content (dried at 105°C)	%	1	46.7	39.2	17	46.7	
PFAS	N-Ethyl perfluorooctane sulfonamidoacetic acid	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.01 0
	Perfluorodecanesulfonic acid (PFDS)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	Perfluoroheptane sulfonic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	10:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	4:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	N-Methyl perfluorooctane sulfonamidoacetic acid	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.01 0
	PFHxS and PFOS (Sum of Total) - Lab Calc	mg/kg	0.0002 : 0.005 (Interlab)	0.0015	0.0022	38	0.0015	<0.005 0
	Perfluorobutane sulfonic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002 : 0.005 (Interlab)	<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	<0.005 0
	8:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	N-Ethyl perfluorooctane sulfonamide	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	N-Ethyl perfluorooctane sulfonamidoethanol	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	N-Methyl perfluorooctane sulfonamide	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	N-Methyl perfluorooctane sulfonamidoethanol	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005 0
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01 0
	Perfluorooctanoic acid (PFOA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	Perfluoropentane sulfonic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	Perfluorobutanoic acid	mg/kg	0.001 : 0.005 (Interlab)	<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	<0.005 0
	Perfluorododecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<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	<0.005 0
	Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002 : 0.005 (Interlab)	<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	<0.005 0
	Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002 : 0.005 (Interlab)	0.0015	0.0022	38	0.0015	<0.005 0
	Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	Perfluorotetradecanoic acid	mg/kg	0.0005 : 0.005 (Interlab)	<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	<0.005 0
	Perfluoroundecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005 0
	PFAS (Sum of Total)	mg/kg	0.0002 : 0.05 (Interlab)	0.0015	0.0022	38	0.0015	<0.05 0
	PFAS (Sum of Total)(WA DER List)	mg/kg	0.0002 : 0.01 (Interlab)	0.0015	0.0022	38	0.0015	<0.01 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: 30 (1-10 x EQL); 30 (10-30 x EQL); 30 (> 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 F8 Groundwater and surface water QAQC results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Field Duplicates (water)
Filter: SDG in('ALSE-Brisbane 31-Aug-17','ALSE-Brisbane 23-Aug-17')

SDG	ALSE-Brisbane 25-Jul-17	ALSE-Brisbane 25-Jul-17	alse	1-Aug-17	alse	alse	alse
Field ID	SP3-0717-1	QA1-0717-1	SP8-0717-1	QA2	SP8-0717-1	SW17-04-0817-1	SW_QA1-0817-1
Sampled Date/Time	24/07/2017	24/07/2017	27/07/2017	27/07/2017	27/07/2017	10/08/2017	10/08/2017
Chem_Grc ChemName							
PFAS	N-Ethyl perfluoroctane sulfonamidoacetic acid	ug/L 0.02 : 0.05 (Interlab)					
	N-Ethyl perfluoroctane sulfonamidoacetic acid	ug/L 0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.05
	Perfluorodecanesulfonic acid (PFDS)	ug/L 0.02 : 0.01 (Interlab)					
	Perfluorodecanesulfonic acid (PFDS)	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.01
	Perfluoroheptane sulfonic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluoroheptane sulfonic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.01
	10:2 Fluorotelomer sulfonic acid	ug/L 0.05 : 0.01 (Interlab)					
	10:2 Fluorotelomer sulfonic acid	ug/L 0.005 : 0.01 (Interlab)	<0.005	<0.005	0	<0.005	<0.01
	4:2 Fluorotelomer sulfonic acid	ug/L 0.05 : 0.01 (Interlab)					
	4:2 Fluorotelomer sulfonic acid	ug/L 0.005 : 0.01 (Interlab)	<0.005	<0.005	0	<0.005	<0.01
	N-Methyl perfluoroctane sulfonamidoacetic acid	ug/L 0.02 : 0.05 (Interlab)					
	N-Methyl perfluoroctane sulfonamidoacetic acid	ug/L 0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.05
	PFHxS and PFOS (Sum of Total) - Lab Calc	ug/L 0.01					
	PFHxS and PFOS (Sum of Total) - Lab Calc	ug/L 0.002 : 0.01 (Interlab)	0.016	0.018	12	0.024	0.03
	Perfluorobutane sulfonic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluorobutane sulfonic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.01
	Perfluorohexane sulfonic acid (PFHxS)	ug/L 0.02 : 0.01 (Interlab)					
	Perfluorohexane sulfonic acid (PFHxS)	ug/L 0.002 : 0.01 (Interlab)	0.009	0.01	11	0.014	0.01
	Perfluoropentanoic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluoropentanoic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.01
	8:2 Fluorotelomer sulfonic acid	ug/L 0.05 : 0.01 (Interlab)					
	8:2 Fluorotelomer sulfonic acid	ug/L 0.005 : 0.01 (Interlab)	<0.005	<0.005	0	<0.005	<0.01
	N-Ethyl perfluoroctane sulfonamide	ug/L 0.05					
	N-Ethyl perfluoroctane sulfonamide	ug/L 0.005 : 0.05 (Interlab)	<0.005	<0.005	0	<0.005	<0.05
	N-Ethyl perfluoroctane sulfonamidoethanol	ug/L 0.05					
	N-Ethyl perfluoroctane sulfonamidoethanol	ug/L 0.005 : 0.05 (Interlab)	<0.005	<0.005	0	<0.005	<0.05
	N-Methyl perfluoroctane sulfonamide	ug/L 0.05					
	N-Methyl perfluoroctane sulfonamide	ug/L 0.005 : 0.05 (Interlab)	<0.005	<0.005	0	<0.005	<0.05
	N-Methyl perfluoroctane sulfonamidoethanol	ug/L 0.05					
	N-Methyl perfluoroctane sulfonamidoethanol	ug/L 0.005 : 0.05 (Interlab)	<0.005	<0.005	0	<0.005	<0.05
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	ug/L 0.05					
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	ug/L 0.005 : 0.05 (Interlab)	<0.005	<0.005	0	<0.005	<0.05
	Perfluorooctanoic acid (PFOA)	ug/L 0.01					
	Perfluorooctanoic acid (PFOA)	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	0.007	<0.01
	Perfluoropentane sulfonic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluoropentane sulfonic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.01
	Perfluoropentane sulfonic acid	ug/L 0.1 : 0.05 (Interlab)					
	Perfluorobutanoic acid	ug/L 0.01 : 0.05 (Interlab)	<0.01	<0.01	0	<0.01	<0.05
	Perfluorodecanoic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluorodecanoic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.01
	Perfluorododecanoic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluorododecanoic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.02
	Perfluorooctanoic acid	ug/L 0.02 : 0.01 (Interlab)					
	Perfluorooctanoic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.02
	Perfluorooctanoic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.02
	Perfluorooctanoic acid	ug/L 0.02 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.02
	Perfluorooctanoic acid	ug/L 0.002 : 0.01 (Interlab)	<0.002	<0.002	0	<0.002	<0.02
	Perfluorooctane sulfonic acid (PFOS)	ug/L 0.01					
	Perfluorooctane sulfonic acid (PFOS)	ug/L 0.002 : 0.01 (Interlab)	0.007	0.008	13	0.01	0.02
	Perfluorooctane sulfonamide (FOSA)	ug/L 0.02 : 0.05 (Interlab)					
	Perfluorooctane sulfonamide (FOSA)	ug/L 0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.05
	Perfluorotetradecanoic acid	ug/L 0.05 : 0.01 (Interlab)					
	Perfluorotetradecanoic acid	ug/L 0.005 : 0.01 (Interlab)	<0.005	<0.005	0	<0.005	<0.05
	Perfluorotridecanoic acid	ug/L 0.02 : 0.01 (Interlab)					



Appendix F
Table F8 Groundwater and surface water QAQC results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Field Duplicates (water)
Filter: SDG in('ALSE-Brisbane 31-Aug-17','ALSE-Brisbane 23-Aug-17')

SDG Field ID Sampled Date/Time	ALSE-Brisbane 25-Jul-17 SP3-0717-1 24/07/2017	ALSE-Brisbane 25-Jul-17 QA1-0717-1 24/07/2017	RPD	ALSE-Brisbane 28-Jul-17 SP8-0717-1 27/07/2017	1-Aug-17 QA2 27/07/2017	RPD	ALSE-Brisbane 11-Aug-17 SW17-04-0817-1 10/08/2017	alse-Brisbane 11-Aug-17 SW_QA1-0817-1 10/08/2017	RPD			
Perfluorotridecanoic acid	µg/L	0.002 : 0.01 (Interlab)		<0.002	<0.002	0	<0.002	<0.01	0	<0.002	<0.002	0
Perfluoroundecanoic acid	µg/L	0.02 : 0.01 (Interlab)										
Perfluoroundecanoic acid	µg/L	0.002 : 0.01 (Interlab)		<0.002	<0.002	0	<0.002	<0.01	0	<0.002	<0.002	0
PFAS (Sum of Total)	µg/L	0.01 : 0.1 (Interlab)										
PFAS (Sum of Total)	µg/L	0.002 : 0.1 (Interlab)		0.016	0.018	12	0.031	<0.1	0	0.805	0.889	10
PFAS (Sum of Total)(WA DER List)	µg/L	0.01 : 0.05 (Interlab)										
PFAS (Sum of Total)(WA DER List)	µg/L	0.002 : 0.05 (Interlab)		0.009	0.01	11	0.021	<0.05	0	0.557	0.594	6

*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: 30 (1-10 x EQL);

30 (10-30 x EQL); 30 (> 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 F8 Groundwater and surface water QAQC results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Field Duplicates (water)
Filter: SDG in('ALSE-Brisbane 31-Aug-17','ALSE-Brisbane 23-Aug-17')

SDG	ALSE-Brisbane 11-Aug-17	14-Aug-17	ALSE-Brisbane 31-Aug-17	ALSE-Brisbane 31-Aug-17	ALSE-Brisbane 31-Aug-17	1-Sep-17
Field ID	SW17-04-0817-1	SW_QA2	GW16-02-0817-1	GW-QA1-0817-1	GW16-02-0817-1	GW-QA2
Sampled Date/Time	10/08/2017	10/08/2017	30/08/2017	30/08/2017	30/08/2017	30/08/2017
Chem_Grc ChemName						
PFAS	N-Ethyl perfluorooctane sulfonamidoacetic acid	µg/L 0.02 : 0.05 (Interlab)		<0.02	<0.02	0 <0.02
	N-Ethyl perfluorooctane sulfonamidoacetic acid	µg/L 0.002 : 0.05 (Interlab)	<0.002	<0.05 0	<0.02	<0.02 0 <0.02
	Perfluorodecanesulfonic acid (PFDS)	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.01
	Perfluorodecanesulfonic acid (PFDS)	µg/L 0.002 : 0.01 (Interlab)	<0.002	<0.01 0	<0.02	<0.02 <0.01 0
	Perfluoroheptane sulfonic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.01
	Perfluoroheptane sulfonic acid	µg/L 0.002 : 0.01 (Interlab)	<0.002	0.02 164	<0.02	<0.02 <0.01 0
	10:2 Fluorotelomer sulfonic acid	µg/L 0.05 : 0.01 (Interlab)			<0.05	<0.05 0 <0.05
	10:2 Fluorotelomer sulfonic acid	µg/L 0.005 : 0.01 (Interlab)	<0.005	<0.01 0	<0.05	<0.05 <0.01 0
	4:2 Fluorotelomer sulfonic acid	µg/L 0.05 : 0.01 (Interlab)			<0.05	<0.05 0 <0.05
	4:2 Fluorotelomer sulfonic acid	µg/L 0.005 : 0.01 (Interlab)	<0.005	<0.01 0	<0.05	<0.05 <0.01 0
	N-Methyl perfluorooctane sulfonamidoacetic acid	µg/L 0.02 : 0.05 (Interlab)			<0.02	<0.02 0 <0.05
	N-Methyl perfluorooctane sulfonamidoacetic acid	µg/L 0.002 : 0.05 (Interlab)	<0.002	<0.05 0	<0.02	<0.02 <0.05 0
	PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L 0.01			0.07	0.07 0.07 0.1 35
	PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L 0.002 : 0.01 (Interlab)	0.605	0.81 29	<0.02	<0.02 0 <0.02
	Perfluorobutane sulfonic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 <0.01 0
	Perfluorobutane sulfonic acid	µg/L 0.002 : 0.01 (Interlab)	0.029	0.03 3	0.04	0.04 0.04 0.05 22
	Perfluorobutane sulfonic acid (PFHxS)	µg/L 0.02 : 0.01 (Interlab)			0.04	0.04 0.04 0.05 22
	Perfluorobutane sulfonic acid (PFHxS)	µg/L 0.002 : 0.01 (Interlab)	0.357	0.39 9	<0.02	<0.02 0 <0.02
	Perfluoropentanoic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 <0.01 0
	Perfluoropentanoic acid	µg/L 0.002 : 0.01 (Interlab)	0.012	0.02 50	<0.02	<0.02 <0.01 0
	8:2 Fluorotelomer sulfonic acid	µg/L 0.05 : 0.01 (Interlab)			<0.05	<0.05 0 <0.05
	8:2 Fluorotelomer sulfonic acid	µg/L 0.005 : 0.01 (Interlab)	<0.005	<0.01 0	<0.05	<0.05 <0.01 0
	N-Ethyl perfluorooctane sulfonamide	µg/L 0.05			<0.05	<0.05 0 <0.05
	N-Ethyl perfluorooctane sulfonamide	µg/L 0.005 : 0.05 (Interlab)	<0.005	<0.05 0	<0.05	<0.05 <0.05 0
	N-Ethyl perfluorooctane sulfonamideethanol	µg/L 0.05			<0.05	<0.05 0 <0.05
	N-Ethyl perfluorooctane sulfonamideethanol	µg/L 0.005 : 0.05 (Interlab)	<0.005	<0.05 0	<0.05	<0.05 <0.05 0
	N-Methyl perfluorooctane sulfonamide	µg/L 0.05			<0.05	<0.05 0 <0.05
	N-Methyl perfluorooctane sulfonamide	µg/L 0.005 : 0.05 (Interlab)	<0.005	<0.05 0	<0.05	<0.05 <0.05 0
	N-Methyl perfluorooctane sulfonamideethanol	µg/L 0.05			<0.05	<0.05 0 <0.05
	N-Methyl perfluorooctane sulfonamideethanol	µg/L 0.005 : 0.05 (Interlab)	<0.005	<0.05 0	<0.05	<0.05 <0.05 0
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L 0.05			<0.05	<0.05 0 <0.05
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L 0.005 : 0.05 (Interlab)	<0.005	<0.05 0	<0.05	<0.05 <0.05 0
	Perfluorooctanoic acid (PFOA)	µg/L 0.01			<0.01	<0.01 0 <0.01
	Perfluorooctanoic acid (PFOA)	µg/L 0.002 : 0.01 (Interlab)	0.008	0.03 116	<0.01	<0.01 <0.01 0
	Perfluoropentanoic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.02
	Perfluoropentanoic acid	µg/L 0.002 : 0.01 (Interlab)	0.069	0.04 53	<0.02	<0.02 <0.01 0
	Perfluorobutanoic acid	µg/L 0.1 : 0.05 (Interlab)			<0.1	<0.1 0 <0.1
	Perfluorobutanoic acid	µg/L 0.01 : 0.05 (Interlab)	<0.01	<0.05 0	<0.1	<0.1 0 <0.05
	Perfluorodecanoic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.02
	Perfluorodecanoic acid	µg/L 0.002 : 0.01 (Interlab)	<0.002	<0.01 0	<0.02	<0.02 0 <0.01
	Perfluorododecanoic acid	µg/L 0.02 : 0.01 (Interlab)	<0.002	<0.01 0	<0.02	<0.02 0 <0.01
	Perfluoroheptanoic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.02
	Perfluoroheptanoic acid	µg/L 0.002 : 0.01 (Interlab)	0.005	0.01 67	<0.02	<0.02 0 <0.01
	Perfluorohexanoic acid (PFHxA)	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.02
	Perfluorohexanoic acid (PFHxA)	µg/L 0.002 : 0.01 (Interlab)	0.077	0.07 10	<0.02	<0.02 0 <0.01
	Perflurononanoic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.02
	Perflurononanoic acid	µg/L 0.002 : 0.01 (Interlab)	<0.002	<0.01 0	<0.02	<0.02 0 <0.01
	Perfluorooctanoic acid (PFOS)	µg/L 0.01			0.03	0.03 0 0.03 0.05 50
	Perfluorooctane sulfonic acid (PFOS)	µg/L 0.002 : 0.01 (Interlab)	0.248	0.42 51	0.03	0.03 0 0.03 0.05 50
	Perfluorooctane sulfonamide (FOSA)	µg/L 0.02 : 0.05 (Interlab)			<0.02	<0.02 0 <0.02
	Perfluorooctane sulfonamide (FOSA)	µg/L 0.002 : 0.05 (Interlab)	<0.002	<0.05 0	<0.02	<0.02 0 <0.05 0
	Perfluorotetradecanoic acid	µg/L 0.05 : 0.01 (Interlab)			<0.05	<0.05 0 <0.05
	Perfluorotetradecanoic acid	µg/L 0.005 : 0.01 (Interlab)	<0.005	<0.01 0	<0.05	<0.05 0 <0.01
	Perfluorotridecanoic acid	µg/L 0.02 : 0.01 (Interlab)			<0.02	<0.02 0 <0.02



Appendix F
Table F8 Groundwater and surface water QAQC results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

Field Duplicates (water)
Filter: SDG in('ALSE-Brisbane 31-Aug-17','ALSE-Brisbane 23-Aug-17')

SDG	ALSE-Brisbane 11-Aug-17	14-Aug-17	ALSE-Brisbane 31-Aug-17	ALSE-Brisbane 31-Aug-17	ALSE-Brisbane 31-Aug-17	1-Sep-17
Field ID	SW17-04-0817-1	SW_QA2	GW16-02-0817-1	GW-QA1-0817-1	RPD	GW16-02-0817-1
Sampled Date/Time	10/08/2017	10/08/2017	30/08/2017	30/08/2017	RPD	GW-QA2
Perfluorotridecanoic acid	µg/L	0.002 : 0.01 (Interlab)	<0.002	<0.01	0	
Perfluoroundecanoic acid	µg/L	0.02 : 0.01 (Interlab)				
Perfluoroundecanoic acid	µg/L	0.002 : 0.01 (Interlab)	<0.002	<0.01	0	
PFAS (Sum of Total)	µg/L	0.01 : 0.1 (Interlab)		0.07	0.07	0
PFAS (Sum of Total)	µg/L	0.002 : 0.1 (Interlab)	0.805	1.03	25	
PFAS (Sum of Total)(WA DER List)	µg/L	0.01 : 0.05 (Interlab)		0.07	0.07	0
PFAS (Sum of Total)(WA DER List)	µg/L	0.002 : 0.05 (Interlab)	0.557	0.97	54	0.07

*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: 30 (1-10 x EQL);

30 (10-30 x EQL); 30 (> 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

Data quality objectives and quality assurance / quality control

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 DQP process is to ensure that the data collection activities are focussed on collecting the information needed to make decisions, and answering the relevant questions leading up to such decisions.

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

Step 1: State the problem

Is PFAS contamination migrating off-site via groundwater or surface water. The focus area of this investigation is the area immediately adjacent to the eastern boundary of the Gold Coast Airport.

Step 2: Identify the principal study question

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:

- Do PFAS impacts extend off the airport site to the east of the Gold Coast Airport in groundwater, surface waters and sediments?
- Do the concentrations of PFAS in the samples collected exceed adopted guideline criteria?

Step 3: Inputs to the decision

To inform the decisions and identify key data gaps and needs, the following information is considered necessary:

- Quantitative data gained through sampling, laboratory analysis and observations made during sampling

Step 4: Boundaries of the study

The study boundary comprises groundwater within the upper (unconfined) aquifer directly to the east of the former fire station and Joint User Hydrant Installation (JUHI) as well as operational spear pumps located in residential properties on Adina Street and Coolangatta Road, directly to the east of the airport.

The study boundary for surface water and sediment includes Coolangatta Creek up stream of the airport, within the Gold Coast Airport boundary and downstream to the discharge point at Kirra Beach.

Step 5: Decision rules

Are PFAS present at concentrations above laboratory level of reporting in groundwater directly to the east of the Gold Coast Airport and in downstream surface waters and sediments?

Groundwater, surface water and sediment analytical data has also been assessed against the criteria adopted from relevant guidance as discussed in Section 2.

Step 6: Tolerable limits on decision errors

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

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

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

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

Table G-1 Summary of quality assurance / quality control criteria

Data quality indicator	Frequency	Data quality acceptance criteria
Precision		
Duplicates (Intra-Laboratory)	1 / 20 samples	30% - 50% of mean concentration of analyte, however, this variation can be expected to be higher for organic analyses than for inorganics, and for low concentrations of analytes.
Duplicates (Inter-Laboratory)	1 / 20 samples	

Data quality indicator	Frequency	Data quality acceptance criteria
Accuracy		
Laboratory (Method) Blank	One sample per batch of 20 samples or fewer	Less than detection limit or limit of reporting (LOR) of the method used.
Laboratory Control Spike		Dynamic Limits varying on previous laboratory data.
Laboratory Spike (Surrogate and Matrix)		<p>Percent recovery is used to assess spiked samples and surrogate standards. Percent recovery is dependent on the type of analyte tested, the concentrations of analytes, and the sample matrix.</p> <p>For matrix spikes ALS uses a matrix spike recovery range of 50-130% and Eurofins adopts a matrix spike recovery range of 50-150%.</p> <p>For surrogate spikes Eurofins adopts static limits that vary dependant on matrix and surrogate compounds.</p>
Laboratory Duplicates	One sample per batch of 10 samples or fewer	<p>Laboratory duplicate samples should have RPD's within the NEPM acceptance criteria of $\pm 30\%$.</p> <p>The laboratory RPDs have been assessed using the following ranges:</p> <p>Results <10 times LOR: no limits.</p> <p>Results between 10 and 20 times LOR 0% - 50%.</p> <p>Results >20 times LOR: 0-20%.</p>
Representativeness		
Sampling appropriate for media and analytes	All samples	-
Samples extracted and analysed within holding times	All samples	Organics (14 days) Inorganics (6 months)
LORs appropriate and consistent	All samples	All samples
Comparability		
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
Standard operating procedures for sample collection & handling	All samples	All samples
Standard analytical methods used for all analyses	All samples	All samples
Completeness		
Sample description and COCs completed and appropriate	All Samples	All Samples
Appropriate documentation	All Samples	All Samples

Data quality indicator	Frequency	Data quality acceptance criteria
Satisfactory frequency and result for QA/QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid

Notes:
 COC: Chain of Custody
 LOR: Limit of Reporting
 QA/QC: Quality assurance / quality control

Step 7: Optimisation of the data collection process

To optimise the design of the investigation, a sampling and analytical program was completed. Results (including QA/QC results) were reviewed as they were received from the laboratory and any inconsistencies or unexpected data were further investigated with the laboratory. Corrective actions were implemented as required.

Field QA/QC

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.

Sampling handling and preservation

Sediment samples were collected by hand, using single use nitrile gloves between each sample, and placed directly into pre-treated laboratory supplied jars. Where this was not possible, a pvc sediment sampler was used to provide access to the sediment. The pvc sampler was cleaned between sampling locations. A rinsate blank was taken from the pvc sampler Rinsate_SED). 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 tubing and bladder and transferred to the laboratory supplied applicable sample bottles.

Surface water samples were collected by hand, directly into laboratory supplied applicable sample bottles.

Samples were placed immediately into the chilled esky and delivered upon return from the site to the laboratory. All samples were transported under a completed chain of custody and were received intact as per the Sample Receipt Notifications (included in Appendix H).

Chain of custody

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

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).

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

Laboratory QA/QC sample	Details
	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 Duplicates	<p>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.</p> <p>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.</p> <p>The RPD is calculated using the following formula:</p> $RPD(\%) = \frac{ C_o - C_d }{C_o + C_d} \times 200$ <p>Where Co = Analyte concentration of the original sample Cd = Analyte concentration of the duplicate sample</p>

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.

Field QC results

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

Rinsate blanks

Rinsate blank samples were taken from the following:

- The pvc sediment sampler (Rinsate_SED)
- The drill auger (Drill_Rinsate)
- The pump used during sampling of the groundwater sampling (GW_rinsate)

Rinsate results are presented in Appendix F. All rinsate results are within the adopted data quality objectives and reported concentrations below the laboratory limit of reporting. This demonstrates sampling decontamination procedures were sufficient to reduce the potential of cross contamination between samples.

Groundwater / surface water

A total of 26 water samples (groundwater and surface water) were submitted as part of the Further Groundwater Investigation.

Three field duplicate (intra-laboratory) samples and three split (inter-laboratory) samples were collected and analysed as part of this investigation. Which equated to one duplicate and one split sample for spear pump samples, groundwater monitoring wells and surface water samples. The target frequency for analysis of field QC samples is 1 in 20 (5%). In this instance, this frequency was achieved for analysis (23%).

The field QC samples collected are provided in Table G-6. Results are provided in Appendix F.

Table G-6 Analysed field QC samples for groundwater/surface water

QA sample	QA/QC sample	Primary sample
GW-QA1	Intra-laboratory	GW16-02
GW-QA2	Inter-laboratory	GW16-02
SW-QA1	Intra-laboratory	SW17-04
SW-QA2	Inter-laboratory	SW17-04
QA01	Intra-laboratory	SP3
QA02	Inter-laboratory	SP8

All samples were reported within the data quality limits with the exception of those summarised in Table G7.

Table G-7 Water RPD results outside of data quality limits

Primary and QA Pair	Analyte	Primary (µg/L)	QAQC (µg/L)	RPD%
SP8 / inter-laboratory duplicate QA2	Perfluorohexane sulfonic acid (PFHxS)	0.014	0.01	33
	Perfluorooctane sulfonic acid (PFOS)	0.01	0.02	67
SW17-04 / inter-laboratory duplicate SW_QA2	Perfluoroheptane sulfonic acid	<0.002	0.02	164
	Perfluoropentanoic acid	0.012	0.02	50
	Perfluorooctanoic acid (PFOA)	0.008	0.03	116
	Perfluoropentane sulfonic acid	0.069	0.04	53
	Perfluoroheptanoic acid	0.005	0.01	67
	Perfluorooctane sulfonic acid	0.248	0.42	51
GW16-02 / inter-laboratory duplicate GW-QA2	PFHxS and PFOS (Sum of Total) - Lab Calc	0.07	0.1	35
	Perfluorooctane sulfonic acid (PFOS)	0.03	0.05	50
	PFAS (Sum of Total)	0.07	0.1	35

All PRD exceedances were associated with inter-laboratory samples, which suggests that variations may be associated with differences in analytical methods and/or sample preparation techniques. Results were also generally low and close to laboratory limits of reporting, where greater levels of variation are acceptable. In most cases the results from the inter-laboratory were higher than that reported at the primary laboratory, however did not impact on results compliance with the adopted guidelines. Accordingly, the elevated RPD are not considered to be significant in terms of the overall interpretation of these results.

Sediment

A total of nine sediment samples were collected and analysed during the site sampling program. Two sediment QC samples (including one intra-laboratory and one inter-laboratory sample) was 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 and collection (22%).

RPDs were calculated between the duplicate results. Field QC samples collected are provided in Table G8.

Table G-8 Analysed field QC samples for sediment

QA sample	QA/QC sample	Primary sample
SED_QA1	Intra-laboratory	SED17-04
SED_QA2	Inter-laboratory	SED17-04

All samples were reported within the data quality limits with the exception of those summarised in Table G9.

Table G-9 Analysed field QC samples for sediment

Primary and QA Pair	Analyte	Primary (mg/kg)	QAQC (mg/kg)	RPD%
SED17-04 and intra-laboratory sample SED_QA1	Perfluorooctane sulfonic acid (PFOS)	0.0015	0.0022	38
	PFHxS and PFOS (Sum of Total)	0.0015	0.0022	38
	PFAS (Sum of Total)	0.0015	0.0022	38

The elevated RPD are considered likely to be due to sample heterogeneity between the primary and secondary sample. In addition, the reported concentrations are low and close to laboratory limits of reporting where greater levels of variation are acceptable. The variation did not impact on the results compliance with the adopted guideline levels. Accordingly, the elevated RPD are not considered to be significant in terms of the overall interpretation of these results.

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 with 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 surrogate spikes was within the data quality criteria, with the exceptions summarised in Table G-9.

Table G-9 Laboratory QA outliers summary

Types	Laboratory Reports	Analytes	Reasons
Matrix Spike	EB1417783 (water)	Sulfate Chloride	MS recovery not determined, background level greater than or four times greater than spike level
Matrix Spike	EB1716504	Sulfate PFHxS PFOS	MS recovery not determined, background level greater than or four times greater than spike level
Matrix Spike	EB1715121	Chloride	MS recovery not determined, background level greater than or four times greater than spike level

Types	Laboratory Reports	Analytes	Reasons
Matrix Spike	EB1715482	Sulfate Chloride	MS recovery not determined, background level greater than or four times greater than spike level
Matrix Spike	EB1717249	Sulfate	MS recovery not determined, background level greater than or four times greater than spike level
Surrogate recovery	556687	PFHxS PFOS	Surrogate recovery is outside of the recommended acceptance criteria due to matrix interference. Since no positive results were reported for any PFAS compounds in this sample, no data was affected.

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 Further Groundwater Investigation Report.

Appendix H – Laboratory reports



**CHAIN OF
CUSTODY**

DADELAIDE 21 Burnie Road Pooraka SA 5066
Ph: 08 8350 0890 E: adelaide@alsglobal.com

QBRISBANE 2 Byll Street Stafford QLD 4053
Ph: 07 3243 7722 E: samples.brishane@alsglobal.com

QGLADSTONE 48 Callomonash Drive Central QLD 4680
Ph: 07 7471 5800 E: gladstone@alsglobal.com

QMACKAY 78 Harbour Road Mackay QLD 4740
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QPERTH 10 Hot Way Malaga WA 6050
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QSYDNEY 277-289 Woodpark Road Smithfield NSW 2164
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QTOWNSVILLE 44-16 Desana Court Rocklea QLD 4016
Ph: 07 4796 0650 E: townsville.environmental@alsglobal.com

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

CLIENT: GHD Pty Ltd

OFFICE: Gold Coast

PROJECT / LOCATION: Gold Coast Airport

PROJECT ID: 4130859

PROJECT MANAGER: Imogen Bird CONTACT PH: 5557 1004 or 0408 062 905

SAMPLER: Angus Hughes

SAMPLER MOBILE: 0433 518 758

EDD FORMAT: EXCEL (XTAB, ENMRG, ESDAT) and PDF

Email Reports to: imogen.bird@ghd.com / angus.hughes@ghd.com

Email Invoice to: AP-FSS@ghd.com / imogen.bird@ghd.com

Reference to ALS Quote No with Table / Suite No's...

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PRIVLEDGED AND CONFIDENTIAL

SAMPLE DETAILS		TESTS / ANALYSIS		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 (EP231X)	Hold												
1	GW17-02_0.1-0.2	23/08/2017	S		2		X												
2	GW17-02_1.0	23/08/2017	S		2		X												
3	GW17-02_2.5	23/08/2017	S		2		X												
4	GW17-02_3.8	23/08/2017	S		2		X												
5	GW17-01_0.1	23/08/2017	S		2		X												
6	GW17-01_1.0	23/08/2017	S		2		X												
7	GW17-01_2.0	23/08/2017	S		2		X												
8	GW17-01_3.0	23/08/2017	S		2		X												
9	QA_S1	23/08/2017	S		1		X												
10	QA_S2	23/08/2017	S		1		X												
11	Drill_rinsate	23/08/2017	W		1	X													
TOTAL																			

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

Environmental Division
Brisbane
Work Order Reference
EB1717458



Telephone : +61 7 3243 7222



Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1717458**

Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 4130859	Page	: 1 of 3
Order number	: ----	Quote number	: ES2015GHD SER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Gold Coast Airport		
Sampler	: ANGUS HUGHES		

Dates

Date Samples Received	: 25-Aug-2017 14:05	Issue Date	: 25-Aug-2017
Client Requested Due	: 01-Sep-2017	Scheduled Reporting Date	: 01-Sep-2017
Date			

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 3.5°C - Ice present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 11 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- 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).**
- 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.
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**



Issue Date : 25-Aug-2017
Page : 2 of 3
Work Order : EB1717458 Amendment 0
Client : GHD PTY LTD

Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested
EB1717458-001	23-Aug-2017 00:00	GW17-02_0.1-0.2	✓
EB1717458-002	23-Aug-2017 00:00	GW17-02_1.0	✓
EB1717458-003	23-Aug-2017 00:00	GW17-02_2.5	✓
EB1717458-004	23-Aug-2017 00:00	GW17-02_3.8	✓
EB1717458-005	23-Aug-2017 00:00	GW17-01_0.1	✓
EB1717458-006	23-Aug-2017 00:00	GW17-01_1.0	✓
EB1717458-007	23-Aug-2017 00:00	GW17-01_2.0	✓
EB1717458-008	23-Aug-2017 00:00	GW17-01_3.0	✓
EB1717458-009	23-Aug-2017 00:00	QA_S1	✓
EB1717458-010	23-Aug-2017 00:00	QA_S2	✓

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EB1717458-011	23-Aug-2017 00:00	Drill_rinsate	✓

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

ANGUS HUGHES

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

IMOGEN BIRD

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

CERTIFICATE OF ANALYSIS

Work Order	: EB1717458	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Matthes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 25-Aug-2017 14:05
Order number	: ----	Date Analysis Commenced	: 31-Aug-2017
C-O-C number	: ----	Issue Date	: 01-Sep-2017 15:09
Sampler	: ANGUS HUGHES		
Site	: Gold Coast Airport		
Quote number	: EN/005/16		
No. of samples received	: 11		
No. of samples analysed	: 1		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatures

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW

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.

- PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).

Analytical Results

Client sample ID				Drill_rinse	---	---	---	---	---
Compound	CAS Number	LOR	Unit	23-Aug-2017 00:00	---	---	---	---	---
				EB1717458-011	-----	-----	-----	-----	-----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	---	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	---	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	---	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorododecanoic acid (PFDsDA)	307-55-1	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorotridecanoic acid (PFTsDA)	72629-94-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorotetradecanoic acid (PFTsDA)	376-06-7	0.05	µg/L	<0.05	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	---	---	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Drill_rinseate	---	---	---	---	---
		Client sampling date / time		23-Aug-2017 00:00	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1717458-011	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	---	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	---	---	---	---	---
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	---	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	---	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	---	---	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	---	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	---	---	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L	<0.01	---	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	---	---	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L	<0.01	---	---	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%	97.6	---	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

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

QUALITY CONTROL REPORT

Work Order	: EB1717458	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 25-Aug-2017
Order number	: ----	Date Analysis Commenced	: 31-Aug-2017
C-O-C number	: ----	Issue Date	: 01-Sep-2017
Sampler	: ANGUS HUGHES		
Site	: Gold Coast Airport		
Quote number	: EN/005/16		
No. of samples received	: 11		
No. of samples analysed	: 1		



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

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic 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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1082471)									
EB1717326-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.22	0.22	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.07	0.08	16.6	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EB1717416-009	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.37	0.36	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.41	0.41	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1082471)									
EB1717326-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.15	0.14	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.14	0.12	10.8	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.07	0.08	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.15	0.14	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.21	0.21	0.00	0% - 50%
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	0.15	0.16	6.37	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	0.11	0.13	16.3	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
EB1717416-009	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.03	0.03	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1082471) - continued									
EB1717416-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.07	0.06	15.9	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.07	0.07	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1082471)									
EB1717326-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	0.11	0.12	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EB1717416-009	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane 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: 1082471)									
EB1717326-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1082471) - continued									
EB1717326-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.07	0.07	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	1.09	1.10	1.00	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EB1717416-009	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: 1082471)									
EB1717326-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.66	2.69	1.12	0% - 20%
EB1717416-009	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.06	1.04	1.90	0% - 20%

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

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

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
							LCS	Low
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1082471)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	94.4	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	93.0	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	93.2	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	96.6	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	96.6	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1082471)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	99.2	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	86.4	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	82.2	70	130
EP231X: Perfluoroctanoic 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	97.6	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	83.2	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	83.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	92.4	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	95.2	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	99.4	70	150
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1082471)								
EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	106	70	150
EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	90.8	70	150
EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	85.6	70	150
EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	73.9	70	150
EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1082471)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	112	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	104	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	93.4	70	130

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1082471) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	92.2	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	MS	Recovery Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1082471)							
EB1717326-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	84.4	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	99.0	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	96.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	91.4	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	79.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1082471)							
EB1717326-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	54.2	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	92.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	86.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	90.0	50	130
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.5 µg/L	97.4	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	98.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	99.8	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	99.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	80.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	56.2	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	122	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1082471)							
EB1717326-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	108	50	130
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	99.8	50	150
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	102	50	150
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	94.9	50	150
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	85.1	50	150
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	91.2	50	130

Sub-Matrix: WATER

				<i>Matrix Spike (MS) Report</i>			
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Spike</i>	<i>Spike Recovery(%)</i>	<i>Recovery Limits (%)</i>	
				<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1082471) - continued							
EB1717326-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	110	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1082471)							
EB1717326-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	108	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	85.0	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	68.2	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	88.4	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1717458	Page	: 1 of 4
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 25-Aug-2017
Site	: Gold Coast Airport	Issue Date	: 01-Sep-2017
Sampler	: ANGUS HUGHES	No. of samples received	: 11
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) Drill_rinsate	23-Aug-2017	---	---	---	31-Aug-2017	19-Feb-2018	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) Drill_rinsate	23-Aug-2017	---	---	---	31-Aug-2017	19-Feb-2018	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) Drill_rinsate	23-Aug-2017	---	---	---	31-Aug-2017	19-Feb-2018	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) Drill_rinsate	23-Aug-2017	---	---	---	31-Aug-2017	19-Feb-2018	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) Drill_rinsate	23-Aug-2017	---	---	---	31-Aug-2017	19-Feb-2018	✓

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	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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

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

QBRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

Gladstone 46 Callomonah Drive Clinton QLD 4670
Ph: 07 7471 6300 E: gladstone@alsglobal.com

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

UMELBOURNE 2-4 Westall Road Springvale VIC
Ph: 03 8549 9600 E: samples.melbourne@agsglob

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

ONFWCASTLE 5 Rose Gun Road Warabrook NSW 2298
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DNOWRA 4/13 Geary Place North Nowra NSW 254
Ph: 024423 2063 E: nowra@alsglobal.com

QPERTH 101 Hed Way Malaga WA 6000
Ph: 08 9209 7855 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8655 E: samples.sydney@aisglobal.com

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

WOLLONGONG 2500 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3126 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	OFFICE: Gold Coast	TURNAROUND REQUIREMENT	<input type="checkbox"/> Standard TAT (List due date): (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	<input type="checkbox"/> Non Standard or urgent TAT (List due date):									
PROJECT / LOCATION: Gold Coast Airport		ALS QUOTE NO.: EN/005/16	COC SEQUENCE NO. (circle)										
PROJECT ID: 4130859			1	2	3	4	5	6	7				
PROJECT MANAGER: Imogen Bird		CONTACT PH: 5557 1004 or 0408 062 905	1	2	3	4	5	6	7				
SAMPLER: Angus Hughes		SAMPLER MOBILE: 0433 518 758	RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:				
		EDD FORMAT: EXCEL (XTAB, ENMRG, ESDAT) and PDF	<i>Angus</i> DATE/TIME: 31-8-17		<i>Comcast D</i> DATE/TIME: 31/8/17 1245								
Email Reports to: imogen.bird@ghd.com / angus.hughes@ghd.com													
Email Invoice to: AP-FSS@ghd.com / imogen.bird@ghd.com													
Reference to ALS Quote No with Table / Suite No's...													
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PRIVILEGED AND CONFIDENTIAL													
ALS USE					SAMPLE DETAILS					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 (EP231X)	Major Ions	TDS					
1	GW16-01	30/08/2017	W		2	X	X	X					
2	GW16-02	30/08/2017	W		2	X	X	X					
3	GW16-03	30/08/2017	W		2	X	X	X					
4	GW17-01	30/08/2017	W		2	X	X	X					
5	GW17-02	30/08/2017	W		2	X	X	X					
6	GW-QA1	30/08/2017	W		2	X							
-	GW-QA2	30/08/2017	W		2								
7	GW-rinsate	30/08/2017	W		1	X							
8	GW MW-X01	30-8-17	W		2	X	X	X					
										Please send to Eurofins for PFAS extended suite analysis			
										Environmental Division Brisbane			
										Work Order Reference EB1717887			

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 Bisulfate 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; D = DMSO; E = EDTA Preserved; R = Rhodamine B; AGC = Plastic Container Acidified with Glacial Acetic Acid; Q = Quaternary Ammonium Preserved; D = DMSO

Telephone : + 61-7-3243 7322





SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB1717887

Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 4130859	Page	: 1 of 2
Order number	: ----	Quote number	: ES2015GHD SER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Gold Coast Airport		
Sampler	: ANGUS HUGHES		

Dates

Date Samples Received	: 31-Aug-2017 12:45	Issue Date	: 31-Aug-2017
Client Requested Due	: 08-Sep-2017	Scheduled Reporting Date	: 08-Sep-2017
Date			

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.8°C - Ice Bricks present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 8 / 8

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
- **Sample "GW-QA2" has been forwarded to Eurofins as per the 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).**
- 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 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EB1717887-001	30-Aug-2017 00:00	GW16-01	✓	✓	✓
EB1717887-002	30-Aug-2017 00:00	GW16-02	✓	✓	✓
EB1717887-003	30-Aug-2017 00:00	GW16-03	✓	✓	✓
EB1717887-004	30-Aug-2017 00:00	GW17-01	✓	✓	✓
EB1717887-005	30-Aug-2017 00:00	GW17-02	✓	✓	✓
EB1717887-006	30-Aug-2017 00:00	GW-QA1		✓	
EB1717887-007	30-Aug-2017 00:00	GW-rinsate		✓	
EB1717887-008	30-Aug-2017 00:00	MW-X01	✓	✓	✓

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

ANGUS HUGHES

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

Email angus.hughes@ghd.com

IMOGEN BIRD

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

Email imogen.bird@ghd.com

CERTIFICATE OF ANALYSIS

Work Order	: EB1717887	Page	: 1 of 9
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 31-Aug-2017 12:45
Order number	: ----	Date Analysis Commenced	: 01-Sep-2017
C-O-C number	: ----	Issue Date	: 07-Sep-2017 15:11
Sampler	: ANGUS HUGHES		
Site	: Gold Coast Airport		
Quote number	: EN/005/16		
No. of samples received	: 8		
No. of samples analysed	: 8		

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.

Signatures

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



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

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW16-01	GW16-02	GW16-03	GW17-01	GW17-02
Compound	CAS Number	LOR	Unit	30-Aug-2017 00:00				
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	91	60	79	72	131
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	31	11	4	31	27
Total Alkalinity as CaCO ₃	----	1	mg/L	31	11	4	31	27
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	5	6	5	4	34
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	19	14	18	7	19
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	11	4	4	9	13
Magnesium	7439-95-4	1	mg/L	1	2	2	1	4
Sodium	7440-23-5	1	mg/L	10	9	12	5	15
Potassium	7440-09-7	1	mg/L	1	<1	<1	<1	2
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.26	0.74	0.69	0.90	1.78
Total Cations	----	0.01	meq/L	1.09	0.76	0.89	0.75	1.68
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	0.04	0.05	0.05	0.17
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	0.03	0.02	1.13	0.43
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	0.2	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		GW16-01	GW16-02	GW16-03	GW17-01	GW17-02
Compound	CAS Number	LOR	Unit	30-Aug-2017 00:00				
				EB1717887-001	EB1717887-002	EB1717887-003	EB1717887-004	EB1717887-005
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.03
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	0.02	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		GW16-01	GW16-02	GW16-03	GW17-01	GW17-02
		Client sampling date / time		30-Aug-2017 00:00				
Compound	CAS Number	LOR	Unit	EB1717887-001	EB1717887-002	EB1717887-003	EB1717887-004	EB1717887-005
				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	0.07	0.07	1.40	0.68
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	0.07	0.07	1.18	0.60
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	0.07	0.07	1.40	0.66
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	111	102	107	111	104

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID		GW-QA1	GW-rinsate	MW-X01	---	---
Compound	CAS Number	LOR	Unit	30-Aug-2017 00:00	30-Aug-2017 00:00	30-Aug-2017 00:00	---	---	---
				EB1717887-006	EB1717887-007	EB1717887-008	-----	-----	-----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	---	10	mg/L	---	---	138	---	---	---
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	---	---	<1	---	---	---
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	---	---	<1	---	---	---
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	---	---	38	---	---	---
Total Alkalinity as CaCO ₃	---	1	mg/L	---	---	38	---	---	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	---	---	38	---	---	---
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	---	---	14	---	---	---
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	---	---	21	---	---	---
Magnesium	7439-95-4	1	mg/L	---	---	3	---	---	---
Sodium	7440-23-5	1	mg/L	---	---	13	---	---	---
Potassium	7440-09-7	1	mg/L	---	---	2	---	---	---
EN055: Ionic Balance									
Total Anions	---	0.01	meq/L	---	---	1.94	---	---	---
Total Cations	---	0.01	meq/L	---	---	1.91	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.02	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.04	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.04	<0.02	1.12	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	<0.01	1.56	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	---	---	---

Analytical Results

Client sample ID				GW-QA1	GW-rinsate	MW-X01	---	---
Compound	CAS Number	LOR	Unit	EB1717887-006	EB1717887-007	EB1717887-008	-----	-----
				Result	Result	Result	---	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.08	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.03	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorododecanoic acid (PFDODA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	---	---
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-QA1	GW-rinsate	MW-X01	---	---
				Client sampling date / time	30-Aug-2017 00:00	30-Aug-2017 00:00	30-Aug-2017 00:00	---	---
Compound	CAS Number	LOR	Unit	EB1717887-006	EB1717887-007	EB1717887-008	-----	-----	---
				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	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	0.07	<0.01	2.85	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.07	<0.01	2.68	---	---	---
Sum of PFAS (WA DER List)	----	0.01	µg/L	0.07	<0.01	2.81	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	111	105	104	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

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

QUALITY CONTROL REPORT

Work Order	: EB1717887	Page	: 1 of 8
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 31-Aug-2017
Order number	: ----	Date Analysis Commenced	: 01-Sep-2017
C-O-C number	: ----	Issue Date	: 07-Sep-2017
Sampler	: ANGUS HUGHES		
Site	: Gold Coast Airport		
Quote number	: EN/005/16		
No. of samples received	: 8		
No. of samples analysed	: 8		



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

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: 1090222)									
EB1717887-001	GW16-01	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	91	87	5.24	No Limit
EB1717984-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	7400	7540	1.85	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1087246)									
EB1717867-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	83	83	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	83	83	0.00	0% - 20%
EB1717868-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	194	193	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	194	193	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1090078)									
EB1717783-001	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	3720	3740	0.403	0% - 20%
EB1717887-004	GW17-01	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	4	4	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 1090079)									
EB1717783-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9410	9690	2.97	0% - 20%
EB1717887-004	GW17-01	ED045G: Chloride	16887-00-6	1	mg/L	7	7	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 1090328)									
EB1717949-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	391	380	2.86	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EB1717495-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	24	23	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	15	0.00	0% - 50%

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 1090328) - continued									
EB1717495-001	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	17	16	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1094491)									
EB1717887-001	GW16-01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EB1717993-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1094491)									
EB1717887-001	GW16-01	EP231X: Perfluoroctanoic 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
EB1717993-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP231X: Perfluoroctanoic 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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1094491)									
EB1717887-001	GW16-01	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: 1094491) - continued									
EB1717887-001	GW16-01	EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EB1717993-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane 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: 1094491)									
EB1717887-001	GW16-01	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
EB1717993-001	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

Page : 5 of 8
Work Order : EB1717887
Client : GHD PTY LTD
Project : 4130859



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: 1094491) - continued									
EB1717993-001	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: 1094491)									
EB1717887-001	GW16-01	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EB1717993-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

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

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

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1090222)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10 <10	293 mg/L 2000 mg/L	109 93.3	88 88	112 112
ED037P: Alkalinity by PC Titrator (QCLot: 1087246)								
ED037-P: Total Alkalinity as CaCO ₃	---	---	mg/L	---	50 mg/L	117	80	120
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QCLot: 1090078)								
ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 100 mg/L	103 95.7	85 85	118 118
ED045G: Chloride by Discrete Analyser (QCLot: 1090079)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	106 106	90 90	115 115
ED093F: Dissolved Major Cations (QCLot: 1090328)								
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: 1094491)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	92.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	96.6	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	97.2	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	98.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1094491)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	113	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	93.2	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	97.4	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	101	70	150



Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
						Spike Concentration	Recovery Limits (%)		
							LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1094491)									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	106	70	130	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	105	70	150	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	104	70	150	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	115	70	150	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.2	70	150	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	117	70	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	113	70	130	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1094491)									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	110	70	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	123	70	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	107	70	130	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	107	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	Spike Recovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1094491) - continued							
EB1717887-001	GW16-01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	105	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	91.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	99.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	94.4	50	130
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.5 µg/L	97.0	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	91.8	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	101	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	97.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	113	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	122	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	104	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1094491)							
EB1717887-001	GW16-01	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	96.4	50	130
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	96.1	50	150
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	96.5	50	150
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	107	50	150
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	72.7	50	150
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	123	50	130
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	112	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1094491)							
EB1717887-001	GW16-01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	124	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	107	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	105	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1717887	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 31-Aug-2017
Site	: Gold Coast Airport	Issue Date	: 07-Sep-2017
Sampler	: ANGUS HUGHES	No. of samples received	: 8
Order number	: ----	No. of samples analysed	: 8

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1717783--002	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	---	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB1717783--002	Anonymous	Chloride	16887-00-6	Not Determined	---	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method	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)	GW16-01, GW16-03, GW17-02,	GW16-02, GW17-01, MW-X01	30-Aug-2017	---	---	---	05-Sep-2017	06-Sep-2017	✓
ED037P: Alkalinity by PC Titrator									
Clear Plastic Bottle - Natural (ED037-P)	GW16-01, GW16-03, GW17-02,	GW16-02, GW17-01, MW-X01	30-Aug-2017	---	---	---	01-Sep-2017	13-Sep-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Clear Plastic Bottle - Natural (ED041G)	GW16-01, GW16-03, GW17-02,	GW16-02, GW17-01, MW-X01	30-Aug-2017	---	---	---	02-Sep-2017	27-Sep-2017	✓
ED045G: Chloride by Discrete Analyser									
Clear Plastic Bottle - Natural (ED045G)	GW16-01, GW16-03, GW17-02,	GW16-02, GW17-01, MW-X01	30-Aug-2017	---	---	---	02-Sep-2017	27-Sep-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						
ED093F: Dissolved Major Cations														
Clear Plastic Bottle - Natural (ED093F)	GW16-01, GW16-03, GW17-02,	GW16-02, GW17-01, MW-X01	30-Aug-2017	---	---	---	06-Sep-2017	06-Sep-2017	✓					
EP231A: Perfluoroalkyl Sulfonic Acids														
HDPE (no PTFE) (EP231X)	GW16-01, GW16-03, GW17-02, GW-rinsate,	GW16-02, GW17-01, GW-QA1, MW-X01	30-Aug-2017	---	---	---	06-Sep-2017	26-Feb-2018	✓					
EP231B: Perfluoroalkyl Carboxylic Acids														
HDPE (no PTFE) (EP231X)	GW16-01, GW16-03, GW17-02, GW-rinsate,	GW16-02, GW17-01, GW-QA1, MW-X01	30-Aug-2017	---	---	---	06-Sep-2017	26-Feb-2018	✓					
EP231C: Perfluoroalkyl Sulfonamides														
HDPE (no PTFE) (EP231X)	GW16-01, GW16-03, GW17-02, GW-rinsate,	GW16-02, GW17-01, GW-QA1, MW-X01	30-Aug-2017	---	---	---	06-Sep-2017	26-Feb-2018	✓					
EP231D: (n:2) Fluorotelomer Sulfonic Acids														
HDPE (no PTFE) (EP231X)	GW16-01, GW16-03, GW17-02, GW-rinsate,	GW16-02, GW17-01, GW-QA1, MW-X01	30-Aug-2017	---	---	---	06-Sep-2017	26-Feb-2018	✓					
EP231P: PFAS Sums														
HDPE (no PTFE) (EP231X)	GW16-01, GW16-03, GW17-02, GW-rinsate,	GW16-02, GW17-01, GW-QA1, MW-X01	30-Aug-2017	---	---	---	06-Sep-2017	26-Feb-2018	✓					

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	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator		ED037-P	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser		ED045G	2	16	12.50	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	8	25.00	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	2	20	10.00	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)		EA015H	2	20	10.00	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator		ED037-P	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser		ED045G	2	16	12.50	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	8	12.50	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	16	6.25	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	8	12.50	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	16	6.25	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	8	12.50	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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	<p>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)</p> <p>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)</p> <p>Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)</p>
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

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□ TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0000 E: townsville.environmental@alsglobal.com

DWOLLONGONG 99 Kenny Street Wollongong NSW 2500
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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; BV = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfric 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; ASSL = Plastic Bag for Acid Sulfric Solts; B = Unpreserved Bag.

- other bottle sent to Melb. 1/9/17

- other photos 2007 to help 1/8/12

wd1 c1/b1

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POST CODE	# CON	CON	110	NOTES	MASS
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Company Name:	GHD Pty Ltd QLD	Order No.:		Received:	Sep 1, 2017 1:00 PM
Address:	145 Ann Street Brisbane QLD 4000	Report #:	561443	Due:	Sep 8, 2017
Project Name:	GOLD COAST AIRPORT	Phone:	07 3316 3000	Priority:	5 Day
Project ID:	4130859	Fax:	07 3316 3333	Contact Name:	Imogen Bird
Eurofins mgt Analytical Services Manager : Ryan Gilbert					

Sample Detail

Per- and Polyfluorinated Alkyl Substances (PFASs)

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	GW-QA2	Aug 30, 2017		Water	B17-Se02316	X
Test Counts						1

Sample Receipt Advice

Company name: **GHD Pty Ltd QLD**
 Contact name: Imogen Bird
 Project name: GOLD COAST AIRPORT
 Project ID: 4130859
 COC number: Not provided
 Turn around time: 5 Day
 Date/Time received: Sep 1, 2017 1:00 PM
 Eurofins | mgt reference: **561443**

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 : 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:

Ryan Gilbert on Phone : or by e.mail: RyanGilbert@eurofins.com

Results will be delivered electronically via e.mail to Imogen Bird - Imogen.Bird@ghd.com.

GHD Pty Ltd QLD
145 Ann Street
Brisbane
QLD 4000



Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 20794

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

Attention: Imogen Bird

Report 561443-W
Project name GOLD COAST AIRPORT
Project ID 4130859
Received Date Sep 01, 2017

Client Sample ID			GW-QA2
Sample Matrix			Water
Eurofins mgt Sample No.			B17-Se02316
Date Sampled			Aug 30, 2017
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDaO) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	125
13C5-PFPeA (surr.)	1	%	98
13C5-PFHxA (surr.)	1	%	121
13C4-PFHpA (surr.)	1	%	139
13C8-PFOA (surr.)	1	%	138
13C5-PFNA (surr.)	1	%	120
13C6-PFDA (surr.)	1	%	84
13C2-PFUnDA (surr.)	1	%	60
13C2-PFDaO (surr.)	1	%	78
13C2-PFTeDA (surr.)	1	%	37
Perfluoroalkane sulfonamides (PFASAs)			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	75
D3-N-MeFOSA (surr.)	1	%	41
D5-N-EtFOSA (surr.)	1	%	34

Client Sample ID			GW-QA2
Sample Matrix			Water
Eurofins mgt Sample No.			B17-Se02316
Date Sampled			Aug 30, 2017
Test/Reference	LOR	Unit	
Perfluoroalkane sulfonamides (PFASAs)			
D7-N-MeFOSE (surr.)	1	%	32
D9-N-EtFOSE (surr.)	1	%	45
D5-N-EtFOSAA (surr.)	1	%	58
D3-N-MeFOSAA (surr.)	1	%	69
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPes)	0.01	ug/L	< 0.01
Perfluorohexameresulfonic acid (PFHxS) ^{N11}	0.01	ug/L	N09 0.05
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	N09 0.05
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	124
18O2-PFHxS (surr.)	1	%	116
13C8-PFOS (surr.)	1	%	104
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexameresulfonic acid (4:2 FTS) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	119
13C2-6:2 FTS (surr.)	1	%	134
13C2-8:2 FTS (surr.)	1	%	76
PFASs Summations			
Sum (PFHxS + PFOS)	0.01	ug/L	0.1
Sum of US EPA PFAS (PFOS + PFOA)	0.01	ug/L	0.05
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.01	ug/L	0.1
Sum of WA DER PFAS (n=10)	0.05	ug/L	0.1
Sum of PFASs (n=28)	0.1	ug/L	0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Sep 11, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Sep 11, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Sep 11, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Sep 11, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name:	GHD Pty Ltd QLD	Order No.:		Received:	Sep 1, 2017 1:00 PM
Address:	145 Ann Street Brisbane QLD 4000	Report #:	561443	Due:	Sep 8, 2017
Project Name:	GOLD COAST AIRPORT	Phone:	07 3316 3000	Priority:	5 Day
Project ID:	4130859	Fax:	07 3316 3333	Contact Name:	Imogen Bird
Eurofins mgt Analytical Services Manager : Ryan Gilbert					

Sample Detail

Per- and Polyfluorinated Alkyl Substances (PFASs)

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	GW-QA2	Aug 30, 2017		Water	B17-Se02316	X
Test Counts						1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Method Blank						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05		0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01		0.01	Pass	
Perfluoroctanoic acid (PFOA)	ug/L	< 0.01		0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01		0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01		0.01	Pass	
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.01		0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01		0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01		0.01	Pass	
Method Blank						
Perfluoroalkane sulfonamides (PFASAs)						
Perfluoroctane sulfonamide (FOSA)	ug/L	< 0.05		0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05		0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05		0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05		0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05		0.05	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05		0.05	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05		0.05	Pass	
Method Blank						
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01		0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01		0.01	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01		0.01	Pass	
Method Blank						
n:2 Fluorotelomer sulfonic acids						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05		0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01		0.01	Pass	
LCS - % Recovery						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	%	86		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	101		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	101		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	102		50-150	Pass	
Perfluoroctanoic acid (PFOA)	%	94		50-150	Pass	
Perfluorononanoic acid (PFNA)	%	117		50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	90		50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	94		50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	109		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	68		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	97		50-150	Pass	
LCS - % Recovery						
Perfluoroalkane sulfonamides (PFASAs)						

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluorooctane sulfonamide (FOSA)	%	98			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	93			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	75			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	114			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	97			50-150	Pass		
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	%	93			50-150	Pass		
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	%	104			50-150	Pass		
LCS - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								
Perfluorobutanesulfonic acid (PFBS)	%	91			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	97			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	92			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	94			50-150	Pass		
Perfluoroctanesulfonic acid (PFOS)	%	92			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	89			50-150	Pass		
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	96			50-150	Pass		
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	%	89			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	97			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	91			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)								
Perfluorobutanoic acid (PFBA)	M17-Se01858	NCP	%	99			50-150	Pass
Perfluoropentanoic acid (PFPeA)	M17-Se01858	NCP	%	104			50-150	Pass
Perfluorohexanoic acid (PFHxA)	M17-Se01858	NCP	%	84			50-150	Pass
Perfluoroheptanoic acid (PFHpA)	M17-Se01858	NCP	%	93			50-150	Pass
Perfluoroctanoic acid (PFOA)	M17-Se01858	NCP	%	104			50-150	Pass
Perfluorononanoic acid (PFNA)	M17-Se01858	NCP	%	123			50-150	Pass
Perfluorodecanoic acid (PFDA)	M17-Se01858	NCP	%	97			50-150	Pass
Perfluoroundecanoic acid (PFUnA)	M17-Se01858	NCP	%	104			50-150	Pass
Perfluorododecanoic acid (PFDa)	M17-Se01858	NCP	%	139			50-150	Pass
Perfluorotridecanoic acid (PFTrDA)	M17-Se01858	NCP	%	89			50-150	Pass
Perfluorotetradecanoic acid (PFTeDA)	M17-Se01858	NCP	%	112			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonamides (PFASAs)								
Perfluorooctane sulfonamide (FOSA)	M17-Se01858	NCP	%	113			50-150	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Se01858	NCP	%	100			50-150	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Se01858	NCP	%	87			50-150	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Se01858	NCP	%	116			50-150	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Se01858	NCP	%	95			50-150	Pass
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Se01858	NCP	%	100			50-150	Pass
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Se01858	NCP	%	101			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	M17-Se01858	NCP	%	97			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Se01858	NCP	%	98			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Se01858	NCP	%	98			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Se01858	NCP	%	101			50-150	Pass	
Perfluoroctanesulfonic acid (PFOS)	M17-Se01858	NCP	%	97			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Se01858	NCP	%	104			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids					Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Se01858	NCP	%	98			50-150	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	M17-Se01858	NCP	%	103			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Se01858	NCP	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Se01858	NCP	%	96			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Se01852	NCP	ug/L	0.01	0.01	5.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Se01852	NCP	ug/L	0.01	0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Se01852	NCP	ug/L	0.02	0.02	2.0	30%	Pass	
Perfluoroctanoic acid (PFOA)	M17-Se01852	NCP	ug/L	0.01	0.01	2.0	30%	Pass	
Perfluorononanoic acid (PFNA)	M17-Se01852	NCP	ug/L	0.05	0.04	5.0	30%	Pass	
Perfluorodecanoic acid (PFDA)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)					Result 1	Result 2	RPD		
Perfluoroctane sulfonamide (FOSA)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M17-Se01852	NCP	ug/L	0.23	0.23	2.0	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M17-Se01852	NCP	ug/L	0.07	0.07	1.0	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M17-Se01852	NCP	ug/L	0.03	0.03	9.0	30%	Pass
Perfluoroctanesulfonic acid (PFOS)	M17-Se01852	NCP	ug/L	0.17	0.16	10	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	M17-Se01852	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Se01852	NCP	ug/L	< 0.01	< 0.01	<1	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
Perfluoroalkyl carboxylic acids (PFCAs)	1	1	1	1	1
Perfluoroalkane sulfonamides (PFASAs)	1	1	1	1	1
Perfluoroalkane sulfonic acids & Perfluoroalkane	1	1	1	1	1
n:2 Fluorotelomer sulfonic acids	1	1	1	1	1

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Ryan Gilbert	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](#).

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**CHAIN OF
CUSTODY**

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QTOWNSVILLE 14-15 Denier Court Bohle QLD 4814
Ph: 07 4766 0890 E: townsville.environmental@alsglobal.com

QWILLONGONG 90 Kenny Street Wollongong NSW 2500
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CLIENT: GHD Pty Ltd

OFFICE: Gold Coast

PROJECT / LOCATION: Gold Coast Airport

PROJECT ID: 4130859

PROJECT MANAGER: Imogen Bird **CONTACT PH:** 5557 1004 or 0408 062 905

SAMPLER: Imogen Bird / Angus Hughes

SAMPLER MOBILE: 0433 518 758

EDD FORMAT: EXCEL (XTAB, ENMRG, ESDAT) and PDF

Email Reports to: imogen.bird@ghd.com / angus.hughes@ghd.com

Email Invoice to: AP-FSS@ghd.com / imogen.bird@ghd.com

Reference to ALS Quote No with Table / Suite No's...

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PRIVLEDGED AND CONFIDENTIAL

SAMPLE ID		DATE / TIME		MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	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							PFAS Extended suite (EP231X-LL)	Major ions	TDS			
1	SW17-01		10/08/2017	W		2	X	X	X			
2	SW17-02		10/08/2017	W		2	X	X	X			
3	SW17-03		10/08/2017	W		2	X	X	X			
4	SW17-04		10/08/2017	W		2	X	X	X			
5	SW17-06		10/08/2017	W		2	X	X	X			
6	SW17-07		10/08/2017	W		2	X	X	X			
7	SW17-08		10/08/2017	W		2	X	X	X			
8	SW16-01A		10/08/2017	W		2	X	X	X			
9	SW16-02A		10/08/2017	W		2	X	X	X			
10	SW16-03A		10/08/2017	W		2	X	X	X			
11	SED17-01		10/08/2017	S		1	X					
12	SED17-03		10/08/2017	S		1	X					
13	SED17-04		10/08/2017	S		1	X					
14	SED17-06		10/08/2017	S		1	X					
15	SED17-07		10/08/2017	S		1	X					
16	SED17-08		10/08/2017	S		1	X					
TOTAL												

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; CRC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AF = Airfreight Unpreserved Plastic;
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphite 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.

[Signature]
Environmental Division
Brisbane
Work Order Reference
EB1716504



Telephone : + 61 7 3243 7222

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB1716504

Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 4130859 Gold Coast Airport	Page	: 1 of 3
Order number	: ----	Quote number	: ES2015GHDSER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: ANGUS HUGHES, IMOGEN BIRD		

Dates

Date Samples Received	: 11-Aug-2017 13:30	Issue Date	: 11-Aug-2017
Client Requested Due	: 21-Aug-2017	Scheduled Reporting Date	: 21-Aug-2017
Date			

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 11.2, 9.0°C - Ice present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 24 / 24

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
- **Selected QA samples will be forwarded to Eurofins as per request. Please note, this will incur a freight forwarding fee.**
- 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).**
- 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 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids)	PFAS - Full Suite (28 analytes)
EB1716504-011	[10-Aug-2017]	SED17-01	✓	✓	
EB1716504-012	[10-Aug-2017]	SED17-03	✓	✓	
EB1716504-013	[10-Aug-2017]	SED17-04	✓	✓	
EB1716504-014	[10-Aug-2017]	SED17-06	✓	✓	
EB1716504-015	[10-Aug-2017]	SED17-07	✓	✓	
EB1716504-016	[10-Aug-2017]	SED17-08	✓	✓	
EB1716504-017	[10-Aug-2017]	SED16-01A	✓	✓	
EB1716504-018	[10-Aug-2017]	SED16-02A	✓	✓	
EB1716504-019	[10-Aug-2017]	SED16-03A	✓	✓	
EB1716504-021	[10-Aug-2017]	SED_QA1	✓	✓	

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X-LL PFAS - Full Suite Low Level (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EB1716504-001	[10-Aug-2017]	SW17-01	✓	✓	✓
EB1716504-002	[10-Aug-2017]	SW17-02	✓	✓	✓
EB1716504-003	[10-Aug-2017]	SW17-03	✓	✓	✓
EB1716504-004	[10-Aug-2017]	SW17-04	✓	✓	✓
EB1716504-005	[10-Aug-2017]	SW17-06	✓	✓	✓
EB1716504-006	[10-Aug-2017]	SW17-07	✓	✓	✓
EB1716504-007	[10-Aug-2017]	SW17-08	✓	✓	✓
EB1716504-008	[10-Aug-2017]	SW16-01A	✓	✓	✓
EB1716504-009	[10-Aug-2017]	SW16-02A	✓	✓	✓
EB1716504-010	[10-Aug-2017]	SW16-03A	✓	✓	✓
EB1716504-020	[10-Aug-2017]	SW_QA1		✓	
EB1716504-022	[10-Aug-2017]	Rinsate_SED		✓	
EB1716504-023	[10-Aug-2017]	SP16	✓	✓	✓

EB1716504-024	[10-Aug-2017]	SP17			
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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

ANGUS HUGHES

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

IMOGEN BIRD

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

CERTIFICATE OF ANALYSIS

Work Order	: EB1716504	Page	: 1 of 16
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 11-Aug-2017 13:30
Order number	: ----	Date Analysis Commenced	: 14-Aug-2017
C-O-C number	: ----	Issue Date	: 23-Aug-2017 13:59
Sampler	: ANGUS HUGHES, IMOGEN BIRD		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 24		
No. of samples analysed	: 24		

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.

Signatures

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



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

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.

- PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		SED17-01	SED17-03	SED17-04	SED17-06	SED17-07
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-011	EB1716504-012	EB1716504-013	EB1716504-014	EB1716504-015
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	70.4	41.6	46.7	28.3	51.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0054	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	0.0361	0.0009	0.0015	0.0024	0.0011
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0006	<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
Perfluoroctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0005	<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 (PFDaDA)	307-55-1	0.0002	mg/kg	0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		SED17-01	SED17-03	SED17-04	SED17-06	SED17-07
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-011	EB1716504-012	EB1716504-013	EB1716504-014	EB1716504-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluoroctane 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	0.0433	0.0011	0.0015	0.0024	0.0011
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0415	0.0011	0.0015	0.0024	0.0011
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0426	0.0011	0.0015	0.0024	0.0011
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	79.0	111	81.0	79.0	84.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		SED17-08	SED16-01A	SED16-02A	SED16-03A	SED_QA1
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-016	EB1716504-017	EB1716504-018	EB1716504-019	EB1716504-021
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	26.6	37.1	33.5	35.2	39.2
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0003	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0065	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0010	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.0008	0.187	0.0004	0.0022
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0006	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0012	<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 (PFDaDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		SED17-08	SED16-01A	SED16-02A	SED16-03A	SED_QA1
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-016	EB1716504-017	EB1716504-018	EB1716504-019	EB1716504-021
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluoroctane 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	0.0008	0.197	0.0004	0.0022
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	0.0008	0.194	0.0004	0.0022
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	0.0008	0.195	0.0004	0.0022
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	74.4	80.5	81.5	106	86.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW17-01	SW17-02	SW17-03	SW17-04	SW17-06
			Client sampling date / time	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-001	EB1716504-002	EB1716504-003	EB1716504-004	EB1716504-005
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	675	1560	8860	7260	9750
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	62	68	65	87	116
Total Alkalinity as CaCO ₃	----	1	mg/L	62	68	65	87	116
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	44	107	610	493	638
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	327	789	4650	3780	4940
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	25	35	108	88	108
Magnesium	7439-95-4	1	mg/L	22	53	298	235	304
Sodium	7440-23-5	1	mg/L	175	451	2620	2090	2700
Potassium	7440-09-7	1	mg/L	7	18	96	78	100
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	11.4	25.8	145	119	155
Total Cations	----	0.01	meq/L	10.8	26.2	146	117	150
Ionic Balance	----	0.01	%	2.38	0.66	0.40	0.85	1.49
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.070	0.053	0.042	0.029	0.018
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.184	0.123	0.102	0.069	0.039
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.918	0.643	0.538	0.357	0.236
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.670	0.808	0.640	0.248	0.187
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW17-01	SW17-02	SW17-03	SW17-04	SW17-05
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-001	EB1716504-002	EB1716504-003	EB1716504-004	EB1716504-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.028	0.021	0.016	0.012	0.008
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.189	0.134	0.102	0.077	0.049
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.011	0.009	0.006	0.005	0.003
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.017	0.015	0.011	0.008	0.006
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	0.002	0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDaDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW17-01	SW17-02	SW17-03	SW17-04	SW17-05
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-001	EB1716504-002	EB1716504-003	EB1716504-004	EB1716504-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	2.09	1.81	1.46	0.805	0.546
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	1.59	1.45	1.18	0.605	0.423
Sum of PFAS (WA DER List)	----	0.002	µg/L	1.42	0.998	0.817	0.557	0.359
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	72.8	71.0	82.6	75.4	77.4

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW17-07	SW17-08	SW16-01A	SW16-02A	SW16-03A
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-006	EB1716504-007	EB1716504-008	EB1716504-009	EB1716504-010
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2360	309	253	608	630
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	157	134	68	68	62
Total Alkalinity as CaCO ₃	----	1	mg/L	157	134	68	68	62
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	153	13	23	42	44
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1040	57	66	301	320
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	33	48	23	28	25
Magnesium	7439-95-4	1	mg/L	65	7	6	21	20
Sodium	7440-23-5	1	mg/L	719	36	49	172	162
Potassium	7440-09-7	1	mg/L	28	4	2	7	7
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	35.6	4.56	3.70	10.7	11.2
Total Cations	----	0.01	meq/L	39.0	4.64	3.82	10.8	10.1
Ionic Balance	----	0.01	%	4.46	0.91	1.66	0.29	4.99
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.003	0.003	0.003	0.100	0.091
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.007	0.006	0.223	0.215
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.006	0.056	0.040	1.22	1.19
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.014	0.030	0.045	2.12	1.91
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW17-07	SW17-08	SW16-01A	SW16-02A	SW16-03A
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-006	EB1716504-007	EB1716504-008	EB1716504-009	EB1716504-010
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	0.040	0.035
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.005	0.009	0.009	0.333	0.268
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	0.015	0.013
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	<0.002	0.002	0.027	0.020
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	0.002	0.003
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDaDA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW17-07	SW17-08	SW16-01A	SW16-02A	SW16-03A
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]
Compound	CAS Number	LOR	Unit	EB1716504-006	EB1716504-007	EB1716504-008	EB1716504-009	EB1716504-010
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.028	0.105	0.105	4.08	3.75
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.020	0.086	0.085	3.34	3.10
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.014	0.075	0.060	1.96	1.83
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	81.4	76.2	73.2	75.2	73.6

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW_QA1	Rinsate_SED	SP16	SP17	---
			Client sampling date / time	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	---
Compound	CAS Number	LOR	Unit	EB1716504-020	EB1716504-022	EB1716504-023	EB1716504-024	-----
				Result	Result	Result	Result	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	---	---	62	110	---
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	---	---	<1	<1	---
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	---	---	<1	<1	---
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	---	---	4	12	---
Total Alkalinity as CaCO ₃	---	1	mg/L	---	---	4	12	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	---	---	4	8	---
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	---	---	9	20	---
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	---	---	7	6	---
Magnesium	7439-95-4	1	mg/L	---	---	<1	1	---
Sodium	7440-23-5	1	mg/L	---	---	6	13	---
Potassium	7440-09-7	1	mg/L	---	---	<1	<1	---
EN055: Ionic Balance								
Total Anions	---	0.01	meq/L	---	---	0.42	0.97	---
Total Cations	---	0.01	meq/L	---	---	0.61	0.95	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.033	<0.002	<0.002	0.003	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.069	<0.002	<0.002	0.009	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.383	<0.002	<0.002	0.075	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.295	<0.002	0.005	0.026	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.012	<0.002	0.002	0.003	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW_QA1	Rinsate_SED	SP16	SP17	---
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	---
Compound	CAS Number	LOR	Unit	EB1716504-020	EB1716504-022	EB1716504-023	EB1716504-024	-----
				Result	Result	Result	Result	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.086	<0.002	0.002	0.009	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.005	<0.002	<0.002	<0.002	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.006	<0.002	<0.002	0.002	---
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SW_QA1	Rinsate_SED	SP16	SP17	---
		Client sampling date / time		[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	[10-Aug-2017]	---
Compound	CAS Number	LOR	Unit	EB1716504-020	EB1716504-022	EB1716504-023	EB1716504-024	-----
				Result	Result	Result	Result	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	---
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.889	<0.002	0.009	0.127	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.678	<0.002	0.005	0.101	---
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.594	<0.002	0.004	0.101	---
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	73.6	73.0	91.2	85.2	---

Surrogate Control Limits

Sub-Matrix: SOIL

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

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	---	70	120

QUALITY CONTROL REPORT

Work Order	: EB1716504	Page	: 1 of 13
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 11-Aug-2017
Order number	: ----	Date Analysis Commenced	: 14-Aug-2017
C-O-C number	: ----	Issue Date	: 23-Aug-2017
Sampler	: ANGUS HUGHES, IMOGEN BIRD		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 24		
No. of samples analysed	: 24		



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1054840)									
EB1716504-011	SED17-01	EA055: Moisture Content	----	1	%	70.4	67.2	4.70	0% - 20%
EM1710685-002	Anonymous	EA055: Moisture Content	----	1	%	1.4	1.5	7.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1054986)									
EB1716434-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0007	0.0007	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: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0029	0.0030	3.72	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB1716504-019	SED16-03A	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: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1054986)									
EB1716434-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1054986) - continued									
EB1716434-001	Anonymous	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
EB1716504-019	SED16-03A	EP231X: Perfluoropentanoic acid (PPeA)	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: Perfluoroctanoic 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: Perfluotridecanoic 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: 1054986)									
EB1716434-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB1716504-019	SED16-03A	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: SOIL			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1054986)									
EB1716434-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB1716504-019	SED16-03A	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
Sub-Matrix: WATER			Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1050951)									
EB1716436-002	Anonymous	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	2090	2070	1.12	0% - 20%
EB1716492-001	Anonymous	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	8440	8650	2.46	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1050954)									
EB1716504-005	SW17-06	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	9750	9910	1.63	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1053221)									
EB1716504-001	SW17-01	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	62	62	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	62	62	0.00	0% - 20%
EB1716504-023	SP16	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	4	7	47.9	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	4	7	47.9	No Limit
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1050902)									
EB1716186-001	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	1	<1	0.00	No Limit
EB1716504-001	SW17-01	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	44	44	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1050904)									
EB1716504-024	SP17	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	8	7	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 1050901)									
EB1716160-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	68	68	0.00	0% - 20%

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 1050901) - continued									
EB1716504-001	SW17-01	ED045G: Chloride	16887-00-6	1	mg/L	327	326	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1050903)									
EB1716504-024	SP17	ED045G: Chloride	16887-00-6	1	mg/L	20	18	10.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1050497)									
EB1716503-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	65	64	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EB1716488-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	16	15	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	31	31	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	197	196	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 1050498)									
EB1716504-005	SW17-06	ED093F: Calcium	7440-70-2	1	mg/L	108	109	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	304	304	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2700	2740	1.41	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	100	101	0.00	0% - 20%
EB1716507-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	60	64	6.80	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	75	80	6.74	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	77	82	6.57	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	14	0.00	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1055356)									
EB1716504-001	SW17-01	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.070	0.068	3.62	0% - 20%
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.184	0.166	9.82	0% - 20%
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.918	0.877	4.52	0% - 20%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.670	0.555	18.7	0% - 20%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EB1716504-020	SW_QA1	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.033	0.034	5.08	0% - 50%
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.069	0.077	10.4	0% - 20%
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.383	0.424	10.0	0% - 20%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1055356) - continued									
EB1716504-020	SW_QA1	EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.295	0.246	18.0	0% - 20%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1055356)									
EB1716504-001	SW17-01	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.028	0.026	3.70	0% - 50%
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.189	0.188	0.691	0% - 20%
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.011	0.011	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.017	0.016	6.06	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	0.002	0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EB1716504-020	SW_QA1	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.012	0.014	13.5	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.086	0.095	9.59	0% - 20%
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.005	0.005	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.006	0.008	18.2	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1055356)									
EB1716504-001	SW17-01	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1055356) - continued									
EB1716504-001	SW17-01	EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1716504-020	SW_QA1	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1055356)									
EB1716504-001	SW17-01	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1716504-020	SW_QA1	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit

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: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
						Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1054986)									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002		mg/kg	<0.0002	0.00125 mg/kg	70.1	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002		mg/kg	<0.0002	0.00125 mg/kg	66.8	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002		mg/kg	<0.0002	0.00125 mg/kg	64.5	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002		mg/kg	<0.0002	0.00125 mg/kg	65.1	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002		mg/kg	<0.0002	0.00125 mg/kg	71.0	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002		mg/kg	<0.0002	0.00125 mg/kg	67.6	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1054986)									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001		mg/kg	<0.001	0.00625 mg/kg	89.4	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002		mg/kg	<0.0002	0.00125 mg/kg	105	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002		mg/kg	<0.0002	0.00125 mg/kg	75.0	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002		mg/kg	<0.0002	0.00125 mg/kg	76.6	57	128
EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.0002		mg/kg	<0.0002	0.00125 mg/kg	88.9	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002		mg/kg	<0.0002	0.00125 mg/kg	107	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002		mg/kg	<0.0002	0.00125 mg/kg	90.4	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002		mg/kg	<0.0002	0.00125 mg/kg	92.5	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002		mg/kg	<0.0002	0.00125 mg/kg	108	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002		mg/kg	<0.0002	0.00125 mg/kg	92.5	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005		mg/kg	<0.0005	0.00312 mg/kg	110	59	129
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1054986)									
EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.0002		mg/kg	<0.0002	0.00125 mg/kg	118	52	132
EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.0005		mg/kg	<0.0005	0.00312 mg/kg	85.1	65	126
EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.0005		mg/kg	<0.0005	0.00312 mg/kg	95.2	64	126
EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005		mg/kg	<0.0005	0.00312 mg/kg	75.4	63	124
EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005		mg/kg	<0.0005	0.00312 mg/kg	94.9	58	125
EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002		mg/kg	<0.0002	0.00125 mg/kg	87.9	61	130
EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002		mg/kg	<0.0002	0.00125 mg/kg	110	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1054986)									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005		mg/kg	<0.0005	0.00125 mg/kg	81.5	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005		mg/kg	<0.0005	0.00125 mg/kg	79.3	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005		mg/kg	<0.0005	0.00125 mg/kg	84.9	62	130

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1054986) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.1	60	130
Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
Method: Compound	CAS Number	LOR	Unit	Result				
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1050951)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10	293 mg/L	106	88	112
				<10	2000 mg/L	91.5	88	112
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1050954)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10	293 mg/L	103	88	112
				<10	2000 mg/L	91.0	88	112
ED037P: Alkalinity by PC Titrator (QC Lot: 1053221)								
ED037-P: Total Alkalinity as CaCO ₃	---	---	mg/L	---	200 mg/L	107	80	120
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1050902)								
ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	85	118
				<1	100 mg/L	95.0	85	118
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1050904)								
ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	85	118
				<1	100 mg/L	95.3	85	118
ED045G: Chloride by Discrete Analyser (QC Lot: 1050901)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.8	90	115
				<1	1000 mg/L	97.1	90	115
ED045G: Chloride by Discrete Analyser (QC Lot: 1050903)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.4	90	115
				<1	1000 mg/L	96.6	90	115
ED093F: Dissolved Major Cations (QC Lot: 1050497)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	---	---	---	---
ED093F: Magnesium	7439-95-4	1	mg/L	<1	---	---	---	---
ED093F: Sodium	7440-23-5	1	mg/L	<1	---	---	---	---
ED093F: Potassium	7440-09-7	1	mg/L	<1	---	---	---	---
ED093F: Dissolved Major Cations (QC Lot: 1050498)								
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 (QC Lot: 1055356)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.05 µg/L	106	60	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.05 µg/L	105	60	130

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1055356) - continued								
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.05 µg/L	107	60	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.05 µg/L	111	60	130
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.05 µg/L	115	60	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.05 µg/L	115	60	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1055356)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.25 µg/L	116	60	130
EP231X-LL: Perfluoropentanoic acid (PPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	110	60	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	113	60	130
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	85.8	60	130
EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	105	60	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	117	60	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	106	60	130
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	102	60	130
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	102	60	130
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	91.4	60	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	72.2	60	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1055356)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	114	60	130
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	98.6	60	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	96.7	60	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	0.125 µg/L	107	60	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	117	60	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	103	60	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	112	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1055356)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.05 µg/L	108	60	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.05 µg/L	102	60	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.05 µg/L	113	60	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.05 µg/L	84.0	60	130

Matrix Spike (MS) Report

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

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1054986)							
EB1716434-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	61.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	60.3	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	62.1	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	54.9	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	65.9	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	76.9	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1054986)							
EB1716434-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	90.0	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	78.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	71.6	50	130
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	83.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	99.0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	82.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	107	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	108	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	110	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	106	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1054986)							
EB1716434-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	106	50	130
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	79.2	30	130
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	106	30	130
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	75.0	30	130
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	90.7	30	130
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	88.7	30	130
		EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	100.0	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1054986)							
EB1716434-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	71.7	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	74.3	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	94.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	95.6	50	130
Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1050902)							
EB1716186-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1050901)							
EB1716186-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	76.2	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1050903)							
EB1716504-024	SP17	ED045G: Chloride	16887-00-6	400 mg/L	105	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1055356)							
EB1716504-002	SW17-02	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.05 µg/L	107	50	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.05 µg/L	101	50	130
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.05 µg/L	# Not Determined	50	130
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.05 µg/L		50	130
		EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.05 µg/L	# Not Determined	50	130
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.05 µg/L		50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1055356)							
EB1716504-002	SW17-02	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	64.5	30	130
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	86.6	50	130
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	127	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	66.4	50	130
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.05 µg/L	108	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	111	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	72.4	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	63.0	50	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	78.8	50	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	78.6	30	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	34.7	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1055356)							
EB1716504-002	SW17-02	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	60.4	50	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	39.7	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	31.0	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.125 µg/L	70.5	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	45.6	30	130

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Recovery Limits (%)	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1055356) - continued				Concentration	MS	Low	High
EB1716504-002	SW17-02	EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	62.6	40	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	40.8	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1055356)				Concentration	MS	Low	High
EB1716504-002	SW17-02	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	75.0	50	130
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	77.6	50	130
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	87.0	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	71.6	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1716504	Page	: 1 of 8
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 11-Aug-2017
Site	: ----	Issue Date	: 23-Aug-2017
Sampler	: ANGUS HUGHES, IMOGEN BIRD	No. of samples received	: 24
Order number	: ----	No. of samples analysed	: 24

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1716186--002	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EB1716504--002	SW17-02	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EB1716504--002	SW17-02	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Frequency of Quality Control Samples

Matrix: WATER

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: SOIL

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

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)	SED17-01, SED17-04, SED17-07, SED16-01A, SED16-03A,	SED17-03, SED17-06, SED17-08, SED16-02A, SED_QA1	10-Aug-2017	----	---	----	15-Aug-2017	24-Aug-2017

Matrix: WATER		Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.							
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Clear Plastic Bottle - Natural (EA015H)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, SP17	10-Aug-2017	---	---	---	15-Aug-2017	17-Aug-2017	✓
ED037P: Alkalinity by PC Titrator									
Clear Plastic Bottle - Natural (ED037-P)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, SP17	10-Aug-2017	---	---	---	15-Aug-2017	24-Aug-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Clear Plastic Bottle - Natural (ED041G)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, SP17	10-Aug-2017	---	---	---	14-Aug-2017	07-Sep-2017	✓
ED045G: Chloride by Discrete Analyser									
Clear Plastic Bottle - Natural (ED045G)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, SP17	10-Aug-2017	---	---	---	14-Aug-2017	07-Sep-2017	✓
ED093F: Dissolved Major Cations									
Clear Plastic Bottle - Natural (ED093F)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, SP17	10-Aug-2017	---	---	---	17-Aug-2017	17-Aug-2017	✓

Matrix: WATER									Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.					
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis								
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation						
EP231A: Perfluoroalkyl Sulfonic Acids														
HDPE (no PTFE) (EP231X-LL)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SW_QA1, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, Rinsate_SED, SP17	10-Aug-2017	17-Aug-2017	06-Feb-2018	✓	17-Aug-2017	06-Feb-2018	✓					
EP231B: Perfluoroalkyl Carboxylic Acids														
HDPE (no PTFE) (EP231X-LL)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SW_QA1, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, Rinsate_SED, SP17	10-Aug-2017	17-Aug-2017	06-Feb-2018	✓	17-Aug-2017	06-Feb-2018	✓					
EP231C: Perfluoroalkyl Sulfonamides														
HDPE (no PTFE) (EP231X-LL)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SW_QA1, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, Rinsate_SED, SP17	10-Aug-2017	17-Aug-2017	06-Feb-2018	✓	17-Aug-2017	06-Feb-2018	✓					
EP231D: (n:2) Fluorotelomer Sulfonic Acids														
HDPE (no PTFE) (EP231X-LL)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SW_QA1, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, Rinsate_SED, SP17	10-Aug-2017	17-Aug-2017	06-Feb-2018	✓	17-Aug-2017	06-Feb-2018	✓					

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-LL)	SW17-01, SW17-03, SW17-06, SW17-08, SW16-02A, SW_QA1, SP16,	SW17-02, SW17-04, SW17-07, SW16-01A, SW16-03A, Rinsate_SED, SP17	10-Aug-2017	17-Aug-2017	06-Feb-2018	✓	17-Aug-2017	06-Feb-2018	✓

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

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
Moisture Content	EA055	2	20	10.00	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)						
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)						
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard

Matrix: WATER

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
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	3	22	13.64	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	33	12.12	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	2	14	14.29	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	21	14.29	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	28	10.71	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)						
Alkalinity by PC Titrator	ED037-P	1	20	5.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	22	18.18	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	14	7.14	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	21	19.05	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	28	14.29	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)						
Chloride by Discrete Analyser	ED045G	2	22	9.09	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	33	6.06	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	14	7.14	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	21	9.52	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	28	7.14	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)						
Chloride by Discrete Analyser	ED045G	2	22	9.09	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	14	7.14	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	21	4.76	5.00	✗ NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . 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 BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. in the presence of ferric ions the librated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	<p>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)</p> <p>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)</p> <p>Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)</p>
Ionic Balance by PCT DA and Turbi SO ₄ DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction followed by and 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
Sample Extraction for PFAS	EP231-PR	SOIL	In house
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house

CLIENT: GHD Pty Ltd OFFICE: Gold Coast PROJECT / LOCATION: Gold Coast Airport PROJECT ID: 4130859 PROJECT MANAGER: Imogen Bird SAMPLER: Imogen Bird / Angus Hughes Email Reports to: imogen.bird@ghd.com / angus.hughes@ghd.com Email Invoice to: AP-FSS@ghd.com / imogen.bird@ghd.com Reference to ALS Quote No with Table / Suite No's...		COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PRIVILEGED AND CONFIDENTIAL	
<p>TURNAROUND REQUIREMENT: <input checked="" type="checkbox"/> Standard TAT (List due date): <input type="checkbox"/> Standard or urgent TAT (List due date): <small>(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)</small></p> <p>ALS QUOTE NO.: EN/005/16</p>			
<p>RELINQUISHED BY: <u>Angus Hughes</u> RECEIVED BY: <u>D. Bassey</u> RECEIVED BY: <u>D. Bassey</u></p> <p>DATE/TIME: <u>11/8/17</u> DATE/TIME: <u>16/8/17</u> DATE/TIME: <u>14/8/17</u> DATE/TIME: <u>8:15</u></p>			
<p>FOR LABORATORY USE ONLY (Check)</p> <p>Custody Seal intact? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</p> <p>Freeze / frozen ice bricks present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</p> <p>Random Sample Temperature on Receipt: <input type="checkbox"/> C</p> <p>Other comment:</p>			
<p>COC SEQUENCE NO. (circle) upon receipt:</p> <p>1 2 3 4 5 6 7</p> <p>1 2 3 4 5 6 7</p> <p>1 2 3 4 5 6 7</p>			
<p>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 (filtered bottle required).</p>			
ALS USE	SAMPLE DETAILS	CONTAINER INFORMATION (MATRIX: Solid(S) Water(W))	Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX & PRESERVATIVE (refer to codes below)
17	SED16-01A	10/08/2017	S PFAS extended suite (EP231X-LL)
18	SED16-02A	10/08/2017	S Major ions
19	SED16-03A	10/08/2017	S TDS
20	SW_QA1	10/08/2017	W TOTAL CONTAINERS
21	SED_QA1	10/08/2017	S PFAS
22	SW_QA2	10/08/2017	W Please send to Eurofins for analysis of PFAS extended suite
23	SP16	10/08/2017	S Please send to Eurofins for analysis of PFAS extended suite
24	SP17		
<p>TOTAL</p>			

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Oxalic Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide/Cd Preserved; AG = Amber Glass Unpreserved Plastic; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Vial SG = Sodium Preserved Vial SG = Sodium Preserved; VS = VOA Vial Sodium Bisulfite Preserved; VS = VOA Vial Sodium Bisulfite Preserved; ST = Sterile Bottles; SP = Sulfuric Preserved Speciation bottle; SP = HCl preserved Plastic; HS = HCl preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; B = Unpreserved Bag.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CON
NOTES
POST CODE
MASS

14-8-17 11.0am

7.6
9.6
10.2
9.1°C 100

Sample Receipt Advice

Company name: **GHD Pty Ltd QLD**
 Contact name: **Imogen Bird**
 Project name: **GOLD COAST AIRPORT**
 Project ID: **4130859**
 COC number: **Not provided**
 Turn around time: **5 Day**
 Date/Time received: **Aug 14, 2017 11:00 AM**
 Eurofins | mgt reference: **558524**

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 : 9.1 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 Imogen Bird - Imogen.Bird@ghd.com.

Company Name: GHD Pty Ltd QLD
Address:
145 Ann Street
Brisbane
QLD 4000

Order No.:
Report #: 558524
Phone: 07 3316 3000
Fax: 07 3316 3333

Received: Aug 14, 2017 11:00 AM
Due: Aug 21, 2017
Priority: 5 Day
Contact Name: Imogen Bird

Project Name: GOLD COAST AIRPORT
Project ID: 4130859

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

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	SW_QA2	Aug 10, 2017		Water	B17-Au16710		X
2	SED_QA2	Aug 10, 2017		Soil	B17-Au16711	X	X
Test Counts				1	2		

Certificate of Analysis

GHD Pty Ltd QLD
145 Ann Street
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: Imogen Bird

Report 558524-S
Project name GOLD COAST AIRPORT
Project ID 4130859
Received Date Aug 14, 2017

Client Sample ID			SED_QA2
Sample Matrix			Soil
Eurofins mgt Sample No.			B17-Au16711
Date Sampled			Aug 10, 2017
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)	5	ug/kg	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnA) ^{N11}	5	ug/kg	< 5
Perfluorododecanoic acid (PFDaO) ^{N11}	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	70
13C5-PFPeA (surr.)	1	%	64
13C5-PFHxA (surr.)	1	%	68
13C4-PFHpA (surr.)	1	%	60
13C8-PFOA (surr.)	1	%	63
13C5-PFNA (surr.)	1	%	74
13C6-PFDA (surr.)	1	%	86
13C2-PFUnDA (surr.)	1	%	106
13C2-PFDaDA (surr.)	1	%	108
13C2-PFTeDA (surr.)	1	%	113
Perfluoroalkane sulfonamides (PFASAs)			
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	67
D3-N-MeFOSA (surr.)	1	%	115
D5-N-EtFOSA (surr.)	1	%	106

Client Sample ID			SED_QA2
Sample Matrix			Soil
Eurofins mgt Sample No.			B17-Au16711
Date Sampled			Aug 10, 2017
Test/Reference	LOR	Unit	
Perfluoroalkane sulfonamides (PFASAs)			
D7-N-MeFOSE (surr.)	1	%	74
D9-N-EtFOSE (surr.)	1	%	89
D5-N-EtFOSAA (surr.)	1	%	121
D3-N-MeFOSAA (surr.)	1	%	120
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPes)	5	ug/kg	< 5
Perfluorohexamersulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	82
18O2-PFHxS (surr.)	1	%	88
13C8-PFOS (surr.)	1	%	104
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexamersulfonic acid (4:2 FTS) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS) ^{N11}	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	5	ug/kg	< 5
13C2-4:2 FTS (surr.)	1	%	13
13C2-6:2 FTS (surr.)	1	%	16
13C2-8:2 FTS (surr.)	1	%	38
PFASs Summations			
Sum (PFHxS + PFOS)	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	5	ug/kg	< 5
Sum of WA DER PFAS (n=10)	10	ug/kg	< 10
Sum of PFASs (n=28)	50	ug/kg	< 50
% Moisture	1	%	30

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Aug 17, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Aug 17, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Aug 17, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Aug 17, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
% Moisture	Brisbane	Aug 14, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name:	GHD Pty Ltd QLD	Order No.:		Received:	Aug 14, 2017 11:00 AM
Address:	145 Ann Street Brisbane QLD 4000	Report #:	558524	Due:	Aug 21, 2017
Project Name:	GOLD COAST AIRPORT	Phone:	07 3316 3000	Priority:	5 Day
Project ID:	4130859	Fax:	07 3316 3333	Contact Name:	Imogen Bird
Eurofins mgt Analytical Services Manager : Mary Makarios					

Sample Detail

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	SW_QA2	Aug 10, 2017		Water	B17-Au16710		X
2	SED_QA2	Aug 10, 2017		Soil	B17-Au16711	X	X
Test Counts				1	2		

Per- and Polyfluorinated Alkyl Substances
(PFASs)
Moisture Set

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluoroctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluoroctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	103			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	112			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	100			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	102			50-150	Pass	
Perfluoroctanoic acid (PFOA)	%	98			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	98			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	93			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	95			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	80			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	97			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluorooctane sulfonamide (FOSA)	%	106			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	97			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	126			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	130			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	83			50-150	Pass		
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	%	104			50-150	Pass		
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	%	99			50-150	Pass		
LCS - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								
Perfluorobutanesulfonic acid (PFBS)	%	99			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	91			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	100			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	98			50-150	Pass		
Perfluoroctanesulfonic acid (PFOS)	%	101			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	96			50-150	Pass		
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	105			50-150	Pass		
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	%	109			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	97			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	136			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)								
Perfluorobutanoic acid (PFBA)	M17-Au17382	NCP	%	108			50-150	Pass
Perfluoropentanoic acid (PFPeA)	M17-Au17382	NCP	%	123			50-150	Pass
Perfluorohexanoic acid (PFHxA)	M17-Au17382	NCP	%	111			50-150	Pass
Perfluoroheptanoic acid (PFHpA)	M17-Au17382	NCP	%	105			50-150	Pass
Perfluoroctanoic acid (PFOA)	M17-Au17382	NCP	%	101			50-150	Pass
Perfluorononanoic acid (PFNA)	M17-Au17382	NCP	%	101			50-150	Pass
Perfluorodecanoic acid (PFDA)	M17-Au17382	NCP	%	96			50-150	Pass
Perfluoroundecanoic acid (PFUnA)	M17-Au17382	NCP	%	109			50-150	Pass
Perfluorododecanoic acid (PFDa)	M17-Au17382	NCP	%	101			50-150	Pass
Perfluorotridecanoic acid (PFTrDA)	M17-Au17382	NCP	%	83			50-150	Pass
Perfluorotetradecanoic acid (PFTeDA)	M17-Au17382	NCP	%	99			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonamides (PFASAs)								
Perfluorooctane sulfonamide (FOSA)	M17-Au17382	NCP	%	111			50-150	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Au17382	NCP	%	99			50-150	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Au17382	NCP	%	134			50-150	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Au17382	NCP	%	130			50-150	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Au17382	NCP	%	99			50-150	Pass
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Au17382	NCP	%	117			50-150	Pass
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Au17382	NCP	%	115			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	M17-Au17382	NCP	%	107			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Au17382	NCP	%	100			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Au17382	NCP	%	105			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Au17382	NCP	%	108			50-150	Pass	
Perfluoroctanesulfonic acid (PFOS)	M17-Au17382	NCP	%	121			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Au17382	NCP	%	103			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids					Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Au17382	NCP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	M17-Au17382	NCP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Au17382	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Au17382	NCP	%	145			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroctanoic acid (PFOA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Au17380	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)					Result 1	Result 2	RPD		
Perfluoroctane sulfonamide (FOSA)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	B17-Au16711	CP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	B17-Au16711	CP	ug/kg	< 10	< 10	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroctanesulfonic acid (PFOS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	B17-Au16711	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-Au16711	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
% Moisture	B17-JI19421	NCP	%	35	36	3.0	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised By

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](#).

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GHD Pty Ltd QLD
145 Ann Street
Brisbane
QLD 4000



Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 20794

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

Attention: Imogen Bird

Report 558524-W
Project name GOLD COAST AIRPORT
Project ID 4130859
Received Date Aug 14, 2017

Client Sample ID			SW_QA2
Sample Matrix			Water
Eurofins mgt Sample No.			B17-Au16710
Date Sampled			Aug 10, 2017
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	N09 0.02
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	N09 0.07
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	N09 0.01
Perfluorooctanoic acid (PFOA)	0.01	ug/L	N09 0.03
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDaO) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	79
13C5-PFPeA (surr.)	1	%	89
13C5-PFHxA (surr.)	1	%	121
13C4-PFHpA (surr.)	1	%	127
13C8-PFOA (surr.)	1	%	131
13C5-PFNA (surr.)	1	%	113
13C6-PFDA (surr.)	1	%	79
13C2-PFUnDA (surr.)	1	%	60
13C2-PFDaO (surr.)	1	%	54
13C2-PFTeDA (surr.)	1	%	29
Perfluoroalkane sulfonamides (PFASAs)			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	73
D3-N-MeFOSA (surr.)	1	%	42
D5-N-EtFOSA (surr.)	1	%	22

Client Sample ID			SW_QA2
Sample Matrix			Water
Eurofins mgt Sample No.			B17-Au16710
Date Sampled			Aug 10, 2017
Test/Reference	LOR	Unit	
Perfluoroalkane sulfonamides (PFASAs)			
D7-N-MeFOSE (surr.)	1	%	37
D9-N-EtFOSE (surr.)	1	%	38
D5-N-EtFOSAA (surr.)	1	%	51
D3-N-MeFOSAA (surr.)	1	%	60
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	0.03
Perfluoropentanesulfonic acid (PFPes)	0.01	ug/L	^{N09} 0.04
Perfluorohexameresulfonic acid (PFHxS) ^{N11}	0.01	ug/L	^{N09} 0.39
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	^{N09} 0.02
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 0.42
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	123
18O2-PFHxS (surr.)	1	%	118
13C8-PFOS (surr.)	1	%	89
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexameresulfonic acid (4:2 FTS) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	177
13C2-6:2 FTS (surr.)	1	%	143
13C2-8:2 FTS (surr.)	1	%	95
PFASs Summations			
Sum (PFHxS + PFOS)	0.01	ug/L	0.81
Sum of US EPA PFAS (PFOS + PFOA)	0.01	ug/L	0.45
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.01	ug/L	0.84
Sum of WA DER PFAS (n=10)	0.05	ug/L	0.97
Sum of PFASs (n=28)	0.1	ug/L	1.03

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Aug 14, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Aug 14, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Aug 14, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Aug 14, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name:	GHD Pty Ltd QLD	Order No.:		Received:	Aug 14, 2017 11:00 AM
Address:	145 Ann Street Brisbane QLD 4000	Report #:	558524	Due:	Aug 21, 2017
Project Name:	GOLD COAST AIRPORT	Phone:	07 3316 3000	Priority:	5 Day
Project ID:	4130859	Fax:	07 3316 3333	Contact Name:	Imogen Bird
Eurofins mgt Analytical Services Manager : Mary Makarios					

Sample Detail

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	SW_QA2	Aug 10, 2017		Water	B17-Au16710		X
2	SED_QA2	Aug 10, 2017		Soil	B17-Au16711	X	X
Test Counts				1	2		

Per- and Polyfluorinated Alkyl Substances
(PFASs)

Moisture Set

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Method Blank						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05		0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01		0.01	Pass	
Perfluoroctanoic acid (PFOA)	ug/L	< 0.01		0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01		0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01		0.01	Pass	
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.01		0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01		0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01		0.01	Pass	
Method Blank						
Perfluoroalkane sulfonamides (PFASAs)						
Perfluoroctane sulfonamide (FOSA)	ug/L	< 0.05		0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05		0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05		0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05		0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05		0.05	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05		0.05	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05		0.05	Pass	
Method Blank						
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01		0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01		0.01	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01		0.01	Pass	
Method Blank						
n:2 Fluorotelomer sulfonic acids						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05		0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01		0.01	Pass	
LCS - % Recovery						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	%	107		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	103		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	95		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	103		50-150	Pass	
Perfluoroctanoic acid (PFOA)	%	116		50-150	Pass	
Perfluorononanoic acid (PFNA)	%	109		50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	104		50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	117		50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	112		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	85		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	130		50-150	Pass	
LCS - % Recovery						
Perfluoroalkane sulfonamides (PFASAs)						

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluorooctane sulfonamide (FOSA)	%	105			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	107			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	96			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	121			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	121			50-150	Pass		
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	%	104			50-150	Pass		
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	%	122			50-150	Pass		
LCS - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								
Perfluorobutanesulfonic acid (PFBS)	%	87			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	103			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	96			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	106			50-150	Pass		
Perfluoroctanesulfonic acid (PFOS)	%	97			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	124			50-150	Pass		
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	106			50-150	Pass		
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	%	94			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	92			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	117			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)								
Perfluorobutanoic acid (PFBA)	B17-Au17423	NCP	%	102			50-150	Pass
Perfluoropentanoic acid (PFPeA)	B17-Au17423	NCP	%	99			50-150	Pass
Perfluorohexanoic acid (PFHxA)	B17-Au17423	NCP	%	91			50-150	Pass
Perfluoroheptanoic acid (PFHpA)	B17-Au17423	NCP	%	98			50-150	Pass
Perfluoroctanoic acid (PFOA)	B17-Au17423	NCP	%	106			50-150	Pass
Perfluorononanoic acid (PFNA)	B17-Au17423	NCP	%	100			50-150	Pass
Perfluorodecanoic acid (PFDA)	B17-Au17423	NCP	%	100			50-150	Pass
Perfluoroundecanoic acid (PFUnA)	B17-Au17423	NCP	%	104			50-150	Pass
Perfluorododecanoic acid (PFDoA)	B17-Au17423	NCP	%	100			50-150	Pass
Perfluorotridecanoic acid (PFTrDA)	B17-Au17423	NCP	%	92			50-150	Pass
Perfluorotetradecanoic acid (PFTeDA)	B17-Au17423	NCP	%	108			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonamides (PFASAs)								
Perfluorooctane sulfonamide (FOSA)	B17-Au17423	NCP	%	98			50-150	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-Au17423	NCP	%	91			50-150	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-Au17423	NCP	%	81			50-150	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-Au17423	NCP	%	103			50-150	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-Au17423	NCP	%	100			50-150	Pass
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	B17-Au17423	NCP	%	100			50-150	Pass
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	B17-Au17423	NCP	%	111			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	B17-Au17423	NCP	%	83			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-Au17423	NCP	%	98			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-Au17423	NCP	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-Au17423	NCP	%	96			50-150	Pass	
Perfluoroctanesulfonic acid (PFOS)	B17-Au17423	NCP	%	84			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-Au17423	NCP	%	109			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids					Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-Au17423	NCP	%	101			50-150	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	B17-Au17423	NCP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-Au17423	NCP	%	85			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-Au17423	NCP	%	99			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroctanoic acid (PFOA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)					Result 1	Result 2	RPD		
Perfluoroctane sulfonamide (FOSA)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroctanesulfonic acid (PFOS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	B17-Au16188	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-Au16188	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

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](#).

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**CHAIN OF
CUSTODY**

ADELAIDE 21 Burns Road Pooraka SA 5095

Ph: 08 8358 0800 E: adelaide@alsglobal.com

BRISBANE 2 Byth Street Stafford QLD 4153
Ph: 07 3243 7277 E: samplesbrisbane@alsglobal.comGLADSTONE 46 Caledonish Drive Clinton QLD 4690
Ph: 07 7471 5800 E: gladstone@alsglobal.comMACKAY 97 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.comMELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8564 2000 E: samples.melbourne@alsglobal.comMUDGEES 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgees.mail@alsglobal.comNEWCASTLE 5 Rose Gully Road Warriewood NSW 2304
Ph: 02 4966 9433 E: samples.newcastle@alsglobal.comNOWRA 4113 Geary Place North Nowra NSW 2541
Ph: 02 4423 2003 E: nowra@alsglobal.comPERTH 10 Kiod Way Malaga WA 6000
Ph: 08 9208 7855 E: samples.perth@alsglobal.comSYDNEY Y 277-289 Woodpark Road Smithfield NSW 2164
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Ph: 07 4703 0800 E: townsville.environmental@alsglobal.comWOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portkentia@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: Gold Coast

PROJECT / LOCATION: Gold Coast Airport

PROJECT ID: 4130859

PROJECT MANAGER: Imogen Bird

CONTACT PH: 5557 1004 or 0408 062 905

SAMPLER: Angus Hughes / Natasha Ambrey

SAMPLER MOBILE: 0433 518 758

EDD FORMAT: EXCEL (XTAB, ENMRG, ESDAT) and PDF

Email Reports to: imogen.bird@ghd.com / angus.hughes@ghd.com

Email Invoice to: AP-FSS@ghd.com / imogen.bird@ghd.com

Reference to ALS Quote No with Table / Suite No's...

TURNAROUND REQUIREMENTS : Standard TAT (List due date):

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

ALS QUOTE NO.:

COC SEQUENCE NO. (circle)

1 2 3 4 5 6 7

1 2 3 4 5 6 7

RELINQUISHED BY:
N. Ambrey

DATE/TIME:

28/07/17 12:40pm 28/7/17 1555

RECEIVED BY:
Cameron

DATE/TIME:

28/07/17 12:40pm 28/7/17 1555

RELINQUISHED BY:

DATE/TIME:

28/07/17 12:40pm 28/7/17 1555

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PRIVLEDGED AND CONFIDENTIAL

Two eskies.

			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 (EP231X-LL)	Major ions	TDS	TRH / BTEX	TRH CS-CS / BTEX	HOLD		
1 QA2		27/07/2017	W		5	X				*			Please forward sampling to Eurofins for PFAS testing
2 SP6		27/07/2017	W		5	X	X	X	X				
3 SP7		27/07/2017	W		5	X	X	X	X				
3 SP8		27/07/2017	W		5	X	X	X	X				
4 SP9		27/07/2017	W		5	X	X	X	X				
5 SP10		27/07/2017	W		5	X	X	X	X				
6 SP11		27/07/2017	W		5	X	X	X	X				
7 Trip blank			W		2					X			
8 SP12		27/07/2017	W		5	X	X	X	X				
9 SP13		27/07/2017	W		5	X	X	X	X				
10 Trip blank			W		2					X			
11 SP14H		28/07/2017	W		5	X	X	X	X				
12 SP14		28/07/2017	W		5	X	X	X	X				
13 SP15		28/07/2017	W		5	X	X	X	X		X		Put on hold
14 SP15A		28/07/2017	W		5	X	X	X	X				
					TOTAL	69							

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitro 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 Bisulfite 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.

Telephone : + 61 7 3243 7222

Environmental Division
Brisbane

Work Order Reference

EB1715482



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB1715482

Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: PO BOX 124 NERANG QLD, AUSTRALIA 4211	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 4130859 Gold Coast Airport	Page	: 1 of 3
Order number	: ----	Quote number	: ES2015GHD SER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: ANGUS HUGHES, NATASHA AMBREY		

Dates

Date Samples Received	: 28-Jul-2017 15:55	Issue Date	: 28-Jul-2017
Client Requested Due	: 03-Aug-2017	Scheduled Reporting Date	: 03-Aug-2017
Date			

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 5.4, 5.4°C - Ice present
Receipt Detail	: MEDIUM ESKIES	No. of samples received / analysed	: 14 / 13

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised that sample "QA2" has been forwarded to Eurofins for analysis as per COC request. Please note that this will incur a freight forwarding fee.**
- 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).**
- 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).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **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 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X-LL PFAS - Full Suite Low Level (28 analytes)	WATER - NIT-01 & 02 Ca., Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-04 TRHBTEN	WATER - W-18 TRHC6 - C9)BTEXN
EB1715482-001	27-Jul-2017 00:00	SP6	✓	✓	✓	✓	✓	
EB1715482-002	27-Jul-2017 00:00	SP7	✓	✓	✓	✓	✓	
EB1715482-003	27-Jul-2017 00:00	SP8	✓	✓	✓	✓	✓	
EB1715482-004	27-Jul-2017 00:00	SP9	✓	✓	✓	✓	✓	
EB1715482-005	27-Jul-2017 00:00	SP10	✓	✓	✓	✓	✓	
EB1715482-006	27-Jul-2017 00:00	SP11	✓	✓	✓	✓	✓	
EB1715482-007	28-Jul-2017 00:00	Trip Blank 172828						✓
EB1715482-008	27-Jul-2017 00:00	SP12	✓	✓	✓	✓	✓	
EB1715482-009	27-Jul-2017 00:00	SP13	✓	✓	✓	✓	✓	
EB1715482-010	28-Jul-2017 00:00	Trip Blank 172827						✓
EB1715482-011	28-Jul-2017 00:00	SP14H	✓	✓	✓	✓	✓	
EB1715482-012	28-Jul-2017 00:00	SP14	✓	✓	✓	✓	✓	
EB1715482-013	28-Jul-2017 00:00	SP15	✓					
EB1715482-014	28-Jul-2017 00:00	SP15A		✓	✓	✓	✓	

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

ANGUS HUGHES

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

IMOGEN BIRD

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

CERTIFICATE OF ANALYSIS

Work Order	: EB1715482	Page	: 1 of 12
Amendment	: 1		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: PO BOX 124 NERANG QLD, AUSTRALIA 4211	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 28-Jul-2017 15:55
Order number	: ----	Date Analysis Commenced	: 31-Jul-2017
C-O-C number	: ----	Issue Date	: 11-Aug-2017 16:45
Sampler	: ANGUS HUGHES, NATASHA AMBREY		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 14		
No. of samples analysed	: 11		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



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

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Amendment (11/08/2017) This report has been amended following the request to remove TPH/BTEXN data.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP6	SP7	SP8	SP9	SP10
Compound	CAS Number	LOR	Unit	27-Jul-2017 00:00				
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	140	93	80	166	31
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	15	18	21	16	7
Total Alkalinity as CaCO ₃	----	1	mg/L	15	18	21	16	7
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	3	11	7	4	8
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	44	13	16	50	12
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	8	8	4	5	6
Magnesium	7439-95-4	1	mg/L	3	2	<1	4	<1
Sodium	7440-23-5	1	mg/L	24	10	16	30	9
Potassium	7440-09-7	1	mg/L	3	2	<1	1	<1
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	1.60	0.96	1.02	1.81	0.64
Total Cations	----	0.01	meq/L	1.77	1.05	0.90	1.91	0.69
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.007	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.004	0.005	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.031	0.046	0.014	0.013	0.018
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.004	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.027	0.105	0.010	0.033	0.027
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002

Analytical Results

Client sample ID				SP6	SP7	SP8	SP9	SP10
Compound	CAS Number	LOR	Unit	EB1715482-001	EB1715482-002	EB1715482-003	EB1715482-004	EB1715482-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.004	0.006	<0.002	<0.002	0.004
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.002	0.002	<0.002	<0.002	0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.009	0.008	0.007	0.004	0.011
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP6	SP7	SP8	SP9	SP10
		Client sampling date / time		27-Jul-2017 00:00				
Compound	CAS Number	LOR	Unit	EB1715482-001	EB1715482-002	EB1715482-003	EB1715482-004	EB1715482-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.077	0.183	0.031	0.050	0.062
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.058	0.151	0.024	0.046	0.045
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.050	0.074	0.021	0.017	0.035
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	92.6	95.6	95.7	97.4	97.2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP11	SP12	SP13	SP14H	SP14
Compound	CAS Number	LOR	Unit	27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	28-Jul-2017 00:00	28-Jul-2017 00:00
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	110	163	122	90	60
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	7	2	16	8	7
Total Alkalinity as CaCO ₃	----	1	mg/L	7	2	16	8	7
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	14	20	10	5	5
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	16	20	16	14	14
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	6	8	6	6	6
Magnesium	7439-95-4	1	mg/L	2	2	2	1	1
Sodium	7440-23-5	1	mg/L	12	13	13	8	7
Potassium	7440-09-7	1	mg/L	2	2	1	<1	<1
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	0.88	1.02	0.98	0.66	0.64
Total Cations	----	0.01	meq/L	1.04	1.18	1.06	0.73	0.69
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.014	0.016	0.008	0.007	0.008
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.015	0.012	0.008	0.026	0.025
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002

Analytical Results

Client sample ID				SP11	SP12	SP13	SP14H	SP14
Compound	CAS Number	LOR	Unit	EB1715482-006	EB1715482-008	EB1715482-009	EB1715482-011	EB1715482-012
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.004	0.002	<0.002	<0.002	<0.002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.004	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.012	0.003	0.002	0.004	0.005
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP11	SP12	SP13	SP14H	SP14
		Client sampling date / time		27-Jul-2017 00:00	27-Jul-2017 00:00	27-Jul-2017 00:00	28-Jul-2017 00:00	28-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EB1715482-006	EB1715482-008	EB1715482-009	EB1715482-011	EB1715482-012
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.049	0.033	0.018	0.037	0.038
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.029	0.028	0.016	0.033	0.033
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.034	0.021	0.010	0.011	0.013
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	94.9	92.9	94.7	97.1	91.3

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP15A	---	---	---	---	---
		Client sampling date / time		28-Jul-2017 00:00	---	---	---	---	---
Compound		CAS Number	LOR	Unit	EB1715482-014	-----	-----	-----	-----
				Result	---	---	---	---	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C		---	10	mg/L	154	---	---	---	---
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO ₃		DMO-210-001	1	mg/L	<1	---	---	---	---
Carbonate Alkalinity as CaCO ₃		3812-32-6	1	mg/L	<1	---	---	---	---
Bicarbonate Alkalinity as CaCO ₃		71-52-3	1	mg/L	5	---	---	---	---
Total Alkalinity as CaCO ₃		---	1	mg/L	5	---	---	---	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA									
Sulfate as SO ₄ - Turbidimetric		14808-79-8	1	mg/L	14	---	---	---	---
ED045G: Chloride by Discrete Analyser									
Chloride		16887-00-6	1	mg/L	43	---	---	---	---
ED093F: Dissolved Major Cations									
Calcium		7440-70-2	1	mg/L	6	---	---	---	---
Magnesium		7439-95-4	1	mg/L	2	---	---	---	---
Sodium		7440-23-5	1	mg/L	27	---	---	---	---
Potassium		7440-09-7	1	mg/L	<1	---	---	---	---
EN055: Ionic Balance									
Total Anions		---	0.01	meq/L	1.60	---	---	---	---
Total Cations		---	0.01	meq/L	1.64	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)		375-73-5	0.002	µg/L	<0.002	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)		2706-91-4	0.002	µg/L	<0.002	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)		355-46-4	0.002	µg/L	0.006	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)		375-92-8	0.002	µg/L	<0.002	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)		1763-23-1	0.002	µg/L	0.011	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)		335-77-3	0.002	µg/L	<0.002	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)		375-22-4	0.01	µg/L	<0.01	---	---	---	---
Perfluoropentanoic acid (PFPeA)		2706-90-3	0.002	µg/L	<0.002	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP15A	---	---	---	---	---
		Client sampling date / time		28-Jul-2017 00:00	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1715482-014	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.003	---	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	---	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	---	---	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	---	---	---	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	---	---	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	---	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP15A	---	---	---	---	---
		Client sampling date / time		28-Jul-2017 00:00	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1715482-014	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	---	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	---	---	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L	0.020	---	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.017	---	---	---	---	---
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.009	---	---	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%	90.1	---	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	---	70	120

QUALITY CONTROL REPORT

Work Order	: EB1715482	Page	: 1 of 8
Amendment	: 1		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: PO BOX 124 NERANG QLD, AUSTRALIA 4211	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 28-Jul-2017
Order number	: ----	Date Analysis Commenced	: 31-Jul-2017
C-O-C number	: ----	Issue Date	: 11-Aug-2017
Sampler	: ANGUS HUGHES, NATASHA AMBREY		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 14		
No. of samples analysed	: 11		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



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

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: 1027162)									
EB1715331-001	Anonymous	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	1420	1350	4.81	0% - 20%
EB1715397-009	Anonymous	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	157	157	0.00	0% - 50%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1027163)									
EB1715482-006	SP11	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	110	104	5.59	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 1024033)									
EB1715433-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	258	262	1.67	0% - 20%
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	258	262	1.67	0% - 20%
EB1715482-005	SP10	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	7	8	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	7	8	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1024752)									
EB1715123-001	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
EB1715482-008	SP12	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	20	20	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1024753)									
EB1715123-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	25	25	0.00	0% - 20%
EB1715482-008	SP12	ED045G: Chloride	16887-00-6	1	mg/L	20	21	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1024802)									
EB1715090-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: WATER

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: 1024802) - continued									
ET1700948-003									
Anonymous		ED093F: Calcium	7440-70-2	1	mg/L	294	297	0.976	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	226	224	0.958	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	233	230	1.22	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1029539)									
EB1715482-001									
SP6		EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.004	0.004	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.031	0.037	19.5	0% - 50%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.027	0.030	9.76	0% - 50%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EB1715482-014									
SP15A		EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.006	0.005	0.00	No Limit
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.011	0.010	0.00	No Limit
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1029539)									
EB1715482-001									
SP6		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.004	0.005	24.7	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.002	0.003	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.009	0.010	10.1	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EB1715482-014									
SP15A		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1029539) - continued									
EB1715482-014	SP15A	EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.003	0.003	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1029539)									
EB1715482-001	SP6	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1715482-014	SP15A	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1029539)									
EB1715482-001	SP6	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1029539) - continued									
EB1715482-001	SP6	EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1715482-014	SP15A	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit

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: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1027162)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	293 mg/L 2000 mg/L	102 95.8	88 88	112 112
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1027163)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	293 mg/L 2000 mg/L	102 102	88 88	112 112
ED037P: Alkalinity by PC Titrator (QCLot: 1024033)								
ED037-P: Total Alkalinity as CaCO ₃	----	----	mg/L	---	200 mg/L	100	80	120
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QCLot: 1024752)								
ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 100 mg/L	89.0 92.2	85 85	118 118
ED045G: Chloride by Discrete Analyser (QCLot: 1024753)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	96.3 91.1	90 90	115 115
ED093F: Dissolved Major Cations (QCLot: 1024802)								
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: 1029539)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.05 µg/L	104	60	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.05 µg/L	117	60	130
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.05 µg/L	124	60	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.05 µg/L	104	60	130
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.05 µg/L	99.8	60	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.05 µg/L	96.4	60	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1029539)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.25 µg/L	102	60	130
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	103	60	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	118	60	130
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	102	60	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	104	60	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	103	60	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	104	60	130
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	92.0	60	130

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1029539) - continued								
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	112	60	130
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	116	60	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	115	60	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1029539)								
EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	125	60	130
EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	108	60	130
EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	123	60	130
EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	0.125 µg/L	97.7	60	130
EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	117	60	130
EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	87.0	60	130
EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	99.4	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1029539)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.05 µg/L	86.4	60	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.05 µg/L	95.2	60	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.05 µg/L	99.6	60	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.05 µg/L	122	60	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	Spike Recovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1024752)							
EB1715442-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1024753)							
EB1715442-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1029539)							
ES1718893-004	Anonymous	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.05 µg/L	86.8	50	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.05 µg/L	118	50	130

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	Spike Recovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1029539) - continued							
ES1718893-004	Anonymous	EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.05 µg/L	121	50	130
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.05 µg/L	104	50	130
		EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.05 µg/L	100	50	130
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.05 µg/L	92.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1029539)							
ES1718893-004	Anonymous	EP231X-LL: Perflorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	91.3	30	130
		EP231X-LL: Perfluopentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	121	50	130
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	119	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	94.6	50	130
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.05 µg/L	108	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	102	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	94.2	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	110	50	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	105	50	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	96.8	30	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	109	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1029539)							
ES1718893-004	Anonymous	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	86.3	50	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	103	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	90.4	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.125 µg/L	104	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	80.8	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	88.8	40	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	95.0	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1029539)							
ES1718893-004	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	110	50	130
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	122	50	130
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	76.4	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	76.8	50	130



Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1715482	Page	: 1 of 6
Amendment	: 1		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 28-Jul-2017
Site	: ----	Issue Date	: 11-Aug-2017
Sampler	: ANGUS HUGHES, NATASHA AMBREY	No. of samples received	: 14
Order number	: ----	No. of samples analysed	: 11

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1715442--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	---	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB1715442--001	Anonymous	Chloride	16887-00-6	Not Determined	---	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method	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)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	---	---	---	01-Aug-2017	03-Aug-2017	✓
Clear Plastic Bottle - Natural (EA015H)	SP14H, SP15A	SP14,	28-Jul-2017	---	---	---	01-Aug-2017	04-Aug-2017	✓
ED037P: Alkalinity by PC Titrator									
Clear Plastic Bottle - Natural (ED037-P)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	---	---	---	02-Aug-2017	10-Aug-2017	✓
Clear Plastic Bottle - Natural (ED037-P)	SP14H, SP15A	SP14,	28-Jul-2017	---	---	---	02-Aug-2017	11-Aug-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	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Clear Plastic Bottle - Natural (ED041G)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	---	---	---	31-Jul-2017	24-Aug-2017	✓
Clear Plastic Bottle - Natural (ED041G)	SP14H, SP15A	SP14,	28-Jul-2017	---	---	---	31-Jul-2017	25-Aug-2017	✓
ED045G: Chloride by Discrete Analyser									
Clear Plastic Bottle - Natural (ED045G)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	---	---	---	31-Jul-2017	24-Aug-2017	✓
Clear Plastic Bottle - Natural (ED045G)	SP14H, SP15A	SP14,	28-Jul-2017	---	---	---	31-Jul-2017	25-Aug-2017	✓
ED093F: Dissolved Major Cations									
Clear Plastic Bottle - Natural (ED093F)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	---	---	---	01-Aug-2017	03-Aug-2017	✓
Clear Plastic Bottle - Natural (ED093F)	SP14H, SP15A	SP14,	28-Jul-2017	---	---	---	01-Aug-2017	04-Aug-2017	✓
EP231A: Perfluoroalkyl Sulfonic Acids									
HDPE (no PTFE) (EP231X-LL)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	03-Aug-2017	23-Jan-2018	✓	03-Aug-2017	23-Jan-2018	✓
HDPE (no PTFE) (EP231X-LL)	SP14H, SP15A	SP14,	28-Jul-2017	03-Aug-2017	24-Jan-2018	✓	03-Aug-2017	24-Jan-2018	✓

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-LL)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	03-Aug-2017	23-Jan-2018	✓	03-Aug-2017	23-Jan-2018
HDPE (no PTFE) (EP231X-LL)	SP14H, SP15A	SP14,	28-Jul-2017	03-Aug-2017	24-Jan-2018	✓	03-Aug-2017	24-Jan-2018
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-LL)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	03-Aug-2017	23-Jan-2018	✓	03-Aug-2017	23-Jan-2018
HDPE (no PTFE) (EP231X-LL)	SP14H, SP15A	SP14,	28-Jul-2017	03-Aug-2017	24-Jan-2018	✓	03-Aug-2017	24-Jan-2018
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-LL)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	03-Aug-2017	23-Jan-2018	✓	03-Aug-2017	23-Jan-2018
HDPE (no PTFE) (EP231X-LL)	SP14H, SP15A	SP14,	28-Jul-2017	03-Aug-2017	24-Jan-2018	✓	03-Aug-2017	24-Jan-2018
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-LL)	SP6, SP8, SP10, SP12,	SP7, SP9, SP11, SP13	27-Jul-2017	03-Aug-2017	23-Jan-2018	✓	03-Aug-2017	23-Jan-2018
HDPE (no PTFE) (EP231X-LL)	SP14H, SP15A	SP14,	28-Jul-2017	03-Aug-2017	24-Jan-2018	✓	03-Aug-2017	24-Jan-2018

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	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator		ED037-P	2	17	11.76	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	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	2	17	11.76	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	3	29	10.34	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator		ED037-P	1	17	5.88	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-LL	1	17	5.88	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	4	29	13.79	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	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	17	5.88	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	1	20	5.00	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)		EA015H	2	29	6.90	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-LL	1	17	5.88	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 thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	<p>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)</p> <p>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)</p> <p>Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)</p>
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



**CHAIN OF
CUSTODY**

Environmental

CLIENT: GHD Pty Ltd

OFFICE: Gold Coast

PROJECT / LOCATION: Gold Coast Airport

PROJECT ID: 4130859

PROJECT MANAGER: Imogen Bird

SAMPLER: Imogen Bird / Angus Hughes

Email Reports to: imogen.bird@ghd.com / angus.hughes@ghd.com

Email Invoice to: AP-FSS@ghd.com / imogen.bird@ghd.com

Reference to ALS Quote No with Table / Suite No's...

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: PRIVILEGED AND CONFIDENTIAL

ALS USE	SAMPLE ID	SAMPLE DETAILS	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
			MATRIX	TYPE & PRESERVATIVE (refer to codes below)		
1	QA1		W			
2	SP1		W			
3	SP2		W			
4	SP3		W			
5	SP4		W			
6	SP5		W			
1	SPS TANK	25/07/2017	W		S	hold.
TOTAL						

Water Container Codes: P = Unpressed Plastic; N = Nitric Preserved Plastic; OHC = Sodium Hydroxide Preserved; ORC = Nitric Preserved Plastic; SH = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved; AG = Amber Glass Unpreserved; AP = Acrylic Unpreserved Plastic
V = VOA Vial Preserved; VO = VOA Vial Preserved; VS = VOA Vial Sulfuric Preserved; AV = Acrylic Unpreserved Amber Glass; HS = HCl Preserved Special 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 Add Sulfuric Sols; B = Unpreserved Bag

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SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: EB1715121		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: 2/90 TAMAR STREET BALLINA NSW, AUSTRALIA 2478	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 4130859 Gold Coast Airport	Page	: 1 of 2
Order number	: ----	Quote number	: ES2015GHD SER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: ANGUS FRASER, IMOGEN BIRD		

Dates

Date Samples Received	: 25-Jul-2017 12:40	Issue Date	: 25-Jul-2017
Client Requested Due	: 31-Jul-2017	Scheduled Reporting Date	: 31-Jul-2017
Date			

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 8.8°C - Ice Bricks present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 7 / 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
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **PFAS(EP231X-LL) analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (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).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **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 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X-LL PFAS - Full Suite Low Level (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-04 TRHBTEN
EB1715121-001	[24-Jul-2017]	QA1			✓		
EB1715121-002	[24-Jul-2017]	SP1		✓	✓	✓	✓
EB1715121-003	[24-Jul-2017]	SP2		✓	✓	✓	✓
EB1715121-004	[24-Jul-2017]	SP3		✓	✓	✓	✓
EB1715121-005	[24-Jul-2017]	SP4		✓	✓	✓	✓
EB1715121-006	[25-Jul-2017]	SP5		✓	✓	✓	✓
EB1715121-007	[25-Jul-2017]	SP5 Tank	✓				

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

ANGUS FRASER

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

IMOGEN BIRD

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

CERTIFICATE OF ANALYSIS

Work Order	: EB1715121	Page	: 1 of 9
Amendment	: 1		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: 2/90 TAMAR STREET BALLINA NSW, AUSTRALIA 2478	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 25-Jul-2017 12:40
Order number	: ----	Date Analysis Commenced	: 26-Jul-2017
C-O-C number	: ----	Issue Date	: 11-Aug-2017 16:23
Sampler	: ANGUS FRASER, IMOGEN BIRD		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 7		
No. of samples analysed	: 6		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
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.

- 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.
- **PFAS(EP231X-LL) analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Ionic Balance out of acceptable limits for some samples due to analytes not quantified in this report.
- Amendment (11/08/2017): This report has been amended following the request to remove TPH/BTEXN data from samples.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QA1	SP1	SP2	SP3	SP4
Compound	CAS Number	LOR	Unit	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	---	85	154	140	82
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	---	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	---	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	---	17	7	22	16
Total Alkalinity as CaCO ₃	---	1	mg/L	---	17	7	22	16
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	---	5	19	4	2
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	---	13	28	48	22
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	---	6	11	6	5
Magnesium	7439-95-4	1	mg/L	---	2	2	2	2
Sodium	7440-23-5	1	mg/L	---	9	24	28	12
Potassium	7440-09-7	1	mg/L	---	1	1	2	<1
EN055: Ionic Balance								
Total Anions	---	0.01	meq/L	---	0.81	1.32	1.88	0.98
Total Cations	---	0.01	meq/L	---	0.88	1.78	1.73	0.94
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.005	0.005	<0.002	0.002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.005	0.004	<0.002	0.004
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.010	0.048	0.020	0.009	0.062
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.004	0.007	<0.002	0.005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.008	0.088	0.114	0.007	0.069
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		QA1	SP1	SP2	SP3	SP4
		Client sampling date / time		[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]
Compound	CAS Number	LOR	Unit	EB1715121-001	EB1715121-002	EB1715121-003	EB1715121-004	EB1715121-005
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.004	0.002	<0.002	0.007
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.007	0.013	<0.002	0.004
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		QA1	SP1	SP2	SP3	SP4
		Client sampling date / time		[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]	[24-Jul-2017]
Compound	CAS Number	LOR	Unit	EB1715121-001	EB1715121-002	EB1715121-003	EB1715121-004	EB1715121-005
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EP231P: PFAS Sums								
Sum of PFAS	----	0.002	µg/L	0.018	0.161	0.165	0.016	0.153
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.018	0.136	0.134	0.016	0.131
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.010	0.069	0.044	0.009	0.079
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.002	%	108	108	112	110	108

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP5	---	---	---	---	---
		Client sampling date / time		[25-Jul-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1715121-006	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	---	10	mg/L	107	---	---	---	---	---
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	---	---	---	---	---
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	---	---	---	---	---
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	14	---	---	---	---	---
Total Alkalinity as CaCO ₃	---	1	mg/L	14	---	---	---	---	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	15	---	---	---	---	---
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	44	---	---	---	---	---
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	8	---	---	---	---	---
Magnesium	7439-95-4	1	mg/L	2	---	---	---	---	---
Sodium	7440-23-5	1	mg/L	13	---	---	---	---	---
Potassium	7440-09-7	1	mg/L	1	---	---	---	---	---
EN055: Ionic Balance									
Total Anions	---	0.01	meq/L	1.83	---	---	---	---	---
Total Cations	---	0.01	meq/L	1.15	---	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.004	---	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.004	---	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.038	---	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.035	---	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	---	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP5	---	---	---	---	---
		Client sampling date / time		[25-Jul-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1715121-006	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.004	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.003	---	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	---	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	---	---	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	---	---	---	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	---	---	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	---	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP5	---	---	---	---	---
		Client sampling date / time		[25-Jul-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1715121-006	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	---	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	---	---	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L	0.088	---	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.073	---	---	---	---	---
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.053	---	---	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%	105	---	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP231S: PFAS Surrogate	---	70	120
13C4-PFOS	---		

QUALITY CONTROL REPORT

Work Order	: EB1715121	Page	: 1 of 9
Amendment	: 1		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: 2/90 TAMAR STREET BALLINA NSW, AUSTRALIA 2478	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 25-Jul-2017
Order number	: ----	Date Analysis Commenced	: 26-Jul-2017
C-O-C number	: ----	Issue Date	: 11-Aug-2017
Sampler	: ANGUS FRASER, IMOGEN BIRD		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 7		
No. of samples analysed	: 6		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Inorganics, Stafford, QLD



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

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: 1019266)									
EB1715121-006	SP5	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	107	115	7.23	0% - 50%
EB1715043-001	Anonymous	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	437	419	4.20	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1016864)									
EB1715110-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	5	5	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	---	1	mg/L	5	5	0.00	No Limit
EB1715112-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	3	3	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	---	1	mg/L	3	3	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 1016865)									
EB1715121-003	SP2	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	7	6	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	---	1	mg/L	7	6	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1016379)									
EB1715080-001	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	356	357	0.00	0% - 20%
EB1715080-011	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	865	871	0.746	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1016378)									
EB1715080-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	11700	11700	0.187	0% - 20%
EB1715080-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	5380	5450	1.17	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1016966)									
EB1715112-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1022159) - continued									
EB1711774-064	Anonymous	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.022	0.022	0.00	0% - 50%
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.010	0.011	11.3	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.006	0.007	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.003	0.004	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EB1715121-006	SP5	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.004	0.004	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.003	0.003	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1022159)									
EB1711774-064	Anonymous	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1715121-006	SP5	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1022159) - continued									
EB1715121-006	SP5	EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1022159)									
EB1711774-064	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1715121-006	SP5	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit

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: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1019266)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10 <10	293 mg/L 2000 mg/L	100 95.4	88 88	112 112
ED037P: Alkalinity by PC Titrator (QCLot: 1016864)								
ED037-P: Total Alkalinity as CaCO ₃	---	---	mg/L	---	200 mg/L	94.6	80	120
ED037P: Alkalinity by PC Titrator (QCLot: 1016865)								
ED037-P: Total Alkalinity as CaCO ₃	---	---	mg/L	---	200 mg/L	93.5	80	120
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QCLot: 1016379)								
ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 100 mg/L	102 101	85 85	118 118
ED045G: Chloride by Discrete Analyser (QCLot: 1016378)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	94.2 98.0	90 90	115 115
ED093F: Dissolved Major Cations (QCLot: 1016966)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	---	---	---	---
ED093F: Magnesium	7439-95-4	1	mg/L	<1	---	---	---	---
ED093F: Sodium	7440-23-5	1	mg/L	<1	---	---	---	---
ED093F: Potassium	7440-09-7	1	mg/L	<1	---	---	---	---
ED093F: Dissolved Major Cations (QCLot: 1016971)								
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: 1022159)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.05 µg/L	78.0	60	130
EP231X-LL: Perfluoropentane sulfonic acid (PPPeS)	2706-91-4	0.002	µg/L	<0.002	0.05 µg/L	94.2	60	130
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.05 µg/L	98.4	60	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.05 µg/L	101	60	130
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.05 µg/L	67.6	60	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.05 µg/L	92.8	60	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1022159)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.25 µg/L	78.3	60	130
EP231X-LL: Perfluoropentanoic acid (PPPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	116	60	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	73.8	60	130

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1022159) - continued								
EP231X-LL: Perfluoroheptanoic acid (PFHpa)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	62.8	60	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	102	60	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	87.2	60	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	74.2	60	130
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	61.8	60	130
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	93.6	60	130
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	71.0	60	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	92.7	60	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1022159)								
EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	82.0	60	130
EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	76.1	60	130
EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	72.2	60	130
EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	0.125 µg/L	64.2	60	130
EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	76.9	60	130
EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	63.8	60	130
EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	77.6	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1022159)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.05 µg/L	68.4	60	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.05 µg/L	105	60	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.05 µg/L	65.0	60	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.05 µg/L	65.0	60	130

Matrix Spike (MS) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	MS	Recovery Limits (%) Low High	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1016379)							
EB1715080-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	102	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1016378)							
EB1715080-002	Anonymous						

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 1016378) - continued							
EB1715080-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1022159)							
EB1711774-064	Anonymous	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.05 µg/L	75.8	50	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.05 µg/L	87.0	50	130
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.05 µg/L	72.4	50	130
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.05 µg/L	104	50	130
		EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.05 µg/L	84.2	50	130
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.05 µg/L	69.4	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1022159)							
EB1711774-064	Anonymous	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	112	30	130
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	105	50	130
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	89.8	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	70.6	50	130
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.05 µg/L	103	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	91.8	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	94.4	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	75.4	50	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	89.4	50	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	57.8	30	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	64.5	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1022159)							
EB1711774-064	Anonymous	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	108	50	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	61.8	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	67.0	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.125 µg/L	68.3	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	63.8	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	70.4	40	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	110	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1022159)							
EB1711774-064	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	76.8	50	130
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	120	50	130

Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	Spike Recovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1022159) - continued							
EB1711774-064	Anonymous	EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	56.4	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	71.2	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1715121	Page	: 1 of 5
Amendment	: 1		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Telephone	: +61-7-3243 7222
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 25-Jul-2017
Site	: ----	Issue Date	: 11-Aug-2017
Sampler	: ANGUS FRASER, IMOGEN BIRD	No. of samples received	: 7
Order number	: ----	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.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED045G: Chloride by Discrete Analyser	EB1715080--002	Anonymous	Chloride	16887-00-6	Not Determined	---	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method	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)	SP1, SP2, SP3, SP4	24-Jul-2017	---	---	---	27-Jul-2017	31-Jul-2017	✓
Clear Plastic Bottle - Natural (EA015H)								
SP5		25-Jul-2017	---	---	---	27-Jul-2017	01-Aug-2017	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)	SP1, SP2, SP3, SP4	24-Jul-2017	---	---	---	26-Jul-2017	07-Aug-2017	✓
Clear Plastic Bottle - Natural (ED037-P)								
SP5		25-Jul-2017	---	---	---	26-Jul-2017	08-Aug-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)	SP1, SP2, SP3, SP4	24-Jul-2017	---	---	---	28-Jul-2017	21-Aug-2017	✓
Clear Plastic Bottle - Natural (ED041G)								
SP5		25-Jul-2017	---	---	---	28-Jul-2017	22-Aug-2017	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)	SP1, SP2, SP3, SP4	24-Jul-2017	---	---	---	28-Jul-2017	21-Aug-2017	✓
Clear Plastic Bottle - Natural (ED045G)								
SP5		25-Jul-2017	---	---	---	28-Jul-2017	22-Aug-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						
ED093F: Dissolved Major Cations														
Clear Plastic Bottle - Natural (ED093F)	SP1, SP3,	SP2, SP4	24-Jul-2017	----	----	---	27-Jul-2017	31-Jul-2017	✓					
Clear Plastic Bottle - Natural (ED093F)	SP5		25-Jul-2017	----	----	---	27-Jul-2017	01-Aug-2017	✓					
EP231A: Perfluoroalkyl Sulfonic Acids														
HDPE (no PTFE) (EP231X-LL)	QA1, SP2, SP4	SP1, SP3,	24-Jul-2017	31-Jul-2017	20-Jan-2018	✓	31-Jul-2017	20-Jan-2018	✓					
HDPE (no PTFE) (EP231X-LL)	SP5		25-Jul-2017	31-Jul-2017	21-Jan-2018	✓	31-Jul-2017	21-Jan-2018	✓					
EP231B: Perfluoroalkyl Carboxylic Acids														
HDPE (no PTFE) (EP231X-LL)	QA1, SP2, SP4	SP1, SP3,	24-Jul-2017	31-Jul-2017	20-Jan-2018	✓	31-Jul-2017	20-Jan-2018	✓					
HDPE (no PTFE) (EP231X-LL)	SP5		25-Jul-2017	31-Jul-2017	21-Jan-2018	✓	31-Jul-2017	21-Jan-2018	✓					
EP231C: Perfluoroalkyl Sulfonamides														
HDPE (no PTFE) (EP231X-LL)	QA1, SP2, SP4	SP1, SP3,	24-Jul-2017	31-Jul-2017	20-Jan-2018	✓	31-Jul-2017	20-Jan-2018	✓					
HDPE (no PTFE) (EP231X-LL)	SP5		25-Jul-2017	31-Jul-2017	21-Jan-2018	✓	31-Jul-2017	21-Jan-2018	✓					
EP231D: (n:2) Fluorotelomer Sulfonic Acids														
HDPE (no PTFE) (EP231X-LL)	QA1, SP2, SP4	SP1, SP3,	24-Jul-2017	31-Jul-2017	20-Jan-2018	✓	31-Jul-2017	20-Jan-2018	✓					
HDPE (no PTFE) (EP231X-LL)	SP5		25-Jul-2017	31-Jul-2017	21-Jan-2018	✓	31-Jul-2017	21-Jan-2018	✓					
EP231P: PFAS Sums														
HDPE (no PTFE) (EP231X-LL)	QA1, SP2, SP4	SP1, SP3,	24-Jul-2017	31-Jul-2017	20-Jan-2018	✓	31-Jul-2017	20-Jan-2018	✓					
HDPE (no PTFE) (EP231X-LL)	SP5		25-Jul-2017	31-Jul-2017	21-Jan-2018	✓	31-Jul-2017	21-Jan-2018	✓					

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	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator		ED037-P	3	24	12.50	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser		ED045G	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	4	32	12.50	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	2	15	13.33	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)		EA015H	2	16	12.50	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator		ED037-P	2	24	8.33	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser		ED045G	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	15	6.67	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)		EA015H	2	16	12.50	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser		ED045G	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	2	32	6.25	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	15	6.67	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)		EA015H	1	16	6.25	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser		ED045G	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	15	6.67	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser		ED041G	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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 thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	<p>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)</p> <p>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)</p> <p>Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)</p>
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Fadi Soro

XO

VPS

From:

Sent:

To:

Subject:

Attachments:

ALSEnviro Brisbane

Wednesday, 2. August 2017 9:11 AM

Fadi Soro; Samples Sydney

FW: RESULTS & EDD & INVOICE for ALS Workorder : EB1715121 | Your Reference: 4130859 Gold Coast Airport
mime-attachment.png; ATT00001.htm; EB1715121_0_COA.pdf; ATT00002.htm; EB1715121_0_ENMRG.CSV; ATT00003.htm; EB1715121_0_XTAB.XLS; ATT00004.htm; EB1715121_0_QC.pdf; ATT00005.htm; EB1715121_0_QCI.pdf; ATT00006.htm; Esdat_EB1715121.zip; ATT00007.htm; L530459_INV.pdf; ATT00008.htm

Importance:

High

Hi Fadi,

Can you organise this rebatch for GHD SER please? You should have the sample in ES.

①

Could you please have sample SP5_tank analysed for PFAS extended suite? Standard TAT is fine. Please direct all results to myself (angus.hughes@ghd.com) and Imogen Bird (Imogen.Bird@ghd.com)

* Sydney samples are in trays: LC78		
Workorder	Login	<input type="checkbox"/> EB1715121

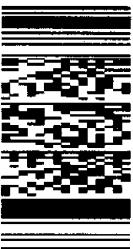
Nikita Tuladhar

Please note the Brisbane laboratory will be closed on Wednesday 16th August, due to the Royal Qld Show (Brisbane area) public holiday.

Regards,

John Pickering
Client Services - Brisbane
Environmental

1



Environmental Division
Sydney
Work Order Reference

ES1719042



T +61 7 3243 7222 D +61 7 3552 8634

john.pickering@alsglobal.com

2 Byth Street (cnr Shand & Byth Street)

Stafford QLD 4053

AUSTRALIA

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From: Angus Hughes [mailto:Angus.Hughes@ghd.com]
Sent: Wednesday, 2 August 2017 8:36 AM
To: ALS Enviro Brisbane <ALSEnviro.Brisbane@alsglobal.com>
Cc: Imogen Bird <Imogen.Bird@ghd.com>
Subject: FW: RESULTS & EDD & INVOICE for ALS Workorder : EB1715121 | Your Reference: 4130859 Gold Coast Airport

Hi

Could you please have sample SPS_tank analysed for PFAS extended suite? Standard TAT is fine. Please direct all results to myself (angus.hughes@ghd.com) and Imogen Bird (Imogen.Bird@ghd.com)

Please let me know if there are any issues with the above request.

Kind regards

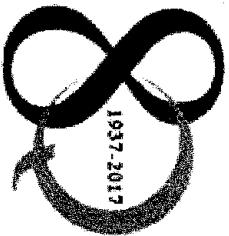
Angus Hughes
Environmental Scientist

GHD

T: 61 7 5557 1040 | V: 411040 | M: 0433 518 758 | F: 61 7 5557 1099 | E: angus.hughes@ghd.com
Level 13 - The Rocket, 203 Robina Town Centre Drive Robina QLD 4226 Australia | www.ghd.com

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GHD celebrating 80 years in Queensland

From: Imogen Bird

Sent: Tuesday, 1 August 2017 4:45 PM

To: Angus Hughes <Angus.Hughes@ghd.com>

Subject: Fwd: RESULTS & EDD & INVOICE for ALS Workorder : EB1715121 | Your Reference: 4130859 Gold Coast Airport

Sent from my iPhone

Begin forwarded message:

From: "angel-no-reply@alsglobal.com" <angel-no-reply@alsglobal.com>

To: "Imogen Bird" <Imogen.Bird@ghd.com>

Subject: RESULTS & EDD & INVOICE for ALS Workorder : EB1715121 | Your Reference: 4130859 Gold Coast Airport

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Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1719042**

Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS IMOGEN BIRD	Contact	: Marnie Thomsett
Address	: 2/90 TAMAR STREET BALLINA NSW, AUSTRALIA 2478	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3316 3333	Facsimile	: +61-2-8784 8500
Project	: 4130859 Gold Coast Airport	Page	: 1 of 2
Order number	: ----	Quote number	: ES2015GHD SER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: ANGUS FRASER, IMOGEN BIRD		

Dates

Date Samples Received	: 02-Aug-2017 09:40	Issue Date	: 02-Aug-2017
Client Requested Due	: 09-Aug-2017	Scheduled Reporting Date	: 09-Aug-2017
Date			

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1°C
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	
ES1719042-001	[25-Jul-2017]	SP5_tank	✓

WATER - EP231X
PFAS - Full Suite (28 analytes)

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

ANGUS HUGHES

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

IMOGEN BIRD

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

CERTIFICATE OF ANALYSIS

Work Order	ES1719042	Page	: 1 of 5
Client	GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	MS IMOGEN BIRD	Contact	: Marnie Thomsett
Address	2/90 TAMAR STREET BALLINA NSW, AUSTRALIA 2478	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	+61 07 3316 3000	Telephone	+61 2 8784 8555
Project	4130859 Gold Coast Airport	Date Samples Received	02-Aug-2017 09:40
Order number	----	Date Analysis Commenced	03-Aug-2017
C-O-C number	----	Issue Date	08-Aug-2017 16:07
Sampler	ANGUS FRASER, IMOGEN BIRD		
Site	----		
Quote number	EN/005/16		
No. of samples received	1		
No. of samples analysed	1		

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.

Signatures

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW



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

General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

Analytical Results

Client sample ID				SP5_tank	---	---	---	---	---
Client sampling date / time				[25-Jul-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	ES1719042-001	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	---	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	---	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	---	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	---	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	---	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorododecanoic acid (PFDsDA)	307-55-1	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorotridecanoic acid (PFTsDA)	72629-94-8	0.02	µg/L	<0.02	---	---	---	---	---
Perfluorotetradecanoic acid (PFTsDA)	376-06-7	0.05	µg/L	<0.05	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	---	---	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP5_tank	---	---	---	---	---
		Client sampling date / time		[25-Jul-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	ES1719042-001	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	---	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	---	---	---	---	---
N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	---	---	---	---	---
N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	---	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	---	---	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	---	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	---	---	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L	0.05	---	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.05	---	---	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L	0.05	---	---	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%	105	---	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

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

QUALITY CONTROL REPORT

Work Order	: ES1719042	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS IMOGEN BIRD	Contact	: Marnie Thomsett
Address	: 2/90 TAMAR STREET BALLINA NSW, AUSTRALIA 2478	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 3316 3000	Telephone	: +61-2-8784 8555
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 02-Aug-2017
Order number	: ----	Date Analysis Commenced	: 03-Aug-2017
C-O-C number	: ----	Issue Date	: 08-Aug-2017
Sampler	: ANGUS FRASER, IMOGEN BIRD		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 1		
No. of samples analysed	: 1		



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

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic 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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1030654)									
EP1708087-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP1708087-011	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1030654)									
EP1708087-001	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
EP1708087-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1030654) - continued									
EP1708087-011	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<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: 1030654)									
EP1708087-001	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
EP1708087-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1030654)									
EP1708087-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1030654) - continued									
EP1708087-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1708087-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1030654)									
EP1708087-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP1708087-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

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

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

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
							LCS	Low
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1030654)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	97.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	98.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1030654)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.6	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	99.0	70	130
EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	108	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	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	101	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	92.2	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	109	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1030654)								
EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	87.0	70	130
EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	113	70	150
EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	99.3	70	150
EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	92.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1030654)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	103	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	105	70	130

Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1030654) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	90.0	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	MS	Recovery Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1030654)							
EP1708087-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	101	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	107	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	105	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	119	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	97.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	111	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1030654)							
EP1708087-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	64.1	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	103	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	105	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	109	50	130
		EP231X: Perfluoroctanoic acid (PFOA)	335-67-1	0.5 µg/L	111	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	93.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	92.8	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	93.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	91.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	95.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	83.0	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1030654)							
EP1708087-001	Anonymous	EP231X: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	84.4	50	130
		EP231X: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	104	50	150
		EP231X: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	104	50	150
		EP231X: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	110	50	150
		EP231X: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	111	50	150
		EP231X: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	99.0	50	130

Sub-Matrix: WATER

				<i>Matrix Spike (MS) Report</i>			
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Spike</i>	<i>Spike Recovery(%)</i>	<i>Recovery Limits (%)</i>	
				<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1030654) - continued							
EP1708087-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	82.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1030654)							
EP1708087-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	105	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	110	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	96.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	93.8	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1719042	Page	: 1 of 4
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS IMOGEN BIRD	Telephone	: +61-2-8784 8555
Project	: 4130859 Gold Coast Airport	Date Samples Received	: 02-Aug-2017
Site	: ----	Issue Date	: 08-Aug-2017
Sampler	: ANGUS FRASER, IMOGEN BIRD	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) SP5_tank	25-Jul-2017	---	---	---	03-Aug-2017	21-Jan-2018	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SP5_tank	25-Jul-2017	---	---	---	03-Aug-2017	21-Jan-2018	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SP5_tank	25-Jul-2017	---	---	---	03-Aug-2017	21-Jan-2018	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SP5_tank	25-Jul-2017	---	---	---	03-Aug-2017	21-Jan-2018	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SP5_tank	25-Jul-2017	---	---	---	03-Aug-2017	21-Jan-2018	✓

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	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	2	15	13.33	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	15	6.67	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	15	6.67	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS		EP231X	1	15	6.67	5.00	✓ NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: EB1717249		
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: PO BOX 124 NERANG QLD, AUSTRALIA 4211	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: imogen.bird@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 4130859	Page	: 1 of 2
Order number	: ----	Quote number	: ES2015GHD SER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Gold Coast Airport		
Sampler	: ANGUS HUGHES, IMOGEN BIRD		

Dates

Date Samples Received	: 23-Aug-2017 14:40	Issue Date	: 23-Aug-2017
Client Requested Due	: 30-Aug-2017	Scheduled Reporting Date	: 30-Aug-2017
Date			

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 5.4°C - Ice present
Receipt Detail	: MEDIUM	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **EP231X-LL analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (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).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **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 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - High Level	WATER - EP231X-LL PFAS - Full Suite Low Level (28 analytes)	WATER_NIT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EB1717249-001	[23-Aug-2017]	SP18	✓	✓	✓

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

ANGUS HUGHES

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

IMOGEN BIRD

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

CERTIFICATE OF ANALYSIS

Work Order	: EB1717249	Page	: 1 of 6
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: PO BOX 124 NERANG QLD, AUSTRALIA 4211	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 23-Aug-2017 14:40
Order number	: ----	Date Analysis Commenced	: 25-Aug-2017
C-O-C number	: ----	Issue Date	: 31-Aug-2017 15:51
Sampler	: ANGUS HUGHES, IMOGEN BIRD		
Site	: Gold Coast Airport		
Quote number	: EN/005/16		
No. of samples received	: 1		
No. of samples analysed	: 1		

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.

Signatures

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

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



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

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.

- EP231X-LL analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP18	---	---	---	---	---
		Client sampling date / time		[23-Aug-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1717249-001	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	---	10	mg/L	194	---	---	---	---	---
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	---	---	---	---	---
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	---	---	---	---	---
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	11	---	---	---	---	---
Total Alkalinity as CaCO ₃	---	1	mg/L	11	---	---	---	---	---
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	43	---	---	---	---	---
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	47	---	---	---	---	---
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	12	---	---	---	---	---
Magnesium	7439-95-4	1	mg/L	5	---	---	---	---	---
Sodium	7440-23-5	1	mg/L	30	---	---	---	---	---
Potassium	7440-09-7	1	mg/L	5	---	---	---	---	---
EN055: Ionic Balance									
Total Anions	---	0.01	meq/L	2.44	---	---	---	---	---
Total Cations	---	0.01	meq/L	2.44	---	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	---	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.007	---	---	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.002	---	---	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	---	---	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.010	---	---	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		SP18	---	---	---	---	---
		Client sampling date / time		[23-Aug-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1717249-001	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.003	---	---	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	---	---	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorododecanoic acid (PFDODA)	307-55-1	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	---	---	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	---	---	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	---	---	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	---	---	---	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	---	---	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	---	---	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	---	---	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	---	---	---	---	---

Analytical Results

Client sample ID				SP18	---	---	---	---	---
Client sampling date / time				[23-Aug-2017]	---	---	---	---	---
Compound	CAS Number	LOR	Unit	EB1717249-001	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	---	---	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	---	---	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L	0.022	---	---	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.009	---	---	---	---	---
Sum of PFAS (WA DER List)	----	0.002	µg/L	0.020	---	---	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%	81.7	---	---	---	---	---

Surrogate Control Limits

Sub-Matrix: WATER

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	---	60	120

QUALITY CONTROL REPORT

Work Order	: EB1717249	Page	: 1 of 8
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Contact	: Vanessa Mattes
Address	: PO BOX 124 NERANG QLD, AUSTRALIA 4211	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 23-Aug-2017
Order number	: ----	Date Analysis Commenced	: 25-Aug-2017
C-O-C number	: ----	Issue Date	: 31-Aug-2017
Sampler	: ANGUS HUGHES, IMOGEN BIRD		
Site	: Gold Coast Airport		
Quote number	: EN/005/16		
No. of samples received	: 1		
No. of samples analysed	: 1		



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

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
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General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1072260)									
EB1717180-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6400	6430	0.343	0% - 20%
EB1717181-006	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	13200	13500	2.44	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1071303)									
EB1717232-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	<1	<1	0.00	No Limit
EB1717232-013	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	6	6	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	6	6	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QC Lot: 1075249)									
EB1717165-006	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	184	192	4.40	0% - 20%
EB1717169-002	Anonymous	ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 1075250)									
EB1717165-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1310	1320	0.503	0% - 20%
EB1717169-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21	21	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1074158)									
EB1717167-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	39	39	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	9	9	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	84	85	1.51	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.00	No Limit
EB1717119-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	20	20	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	14	14	0.00	0% - 50%

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 1074158) - continued									
EB1717119-001	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	15	15	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1077347)									
EB1717232-023	Anonymous	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.012	0.011	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.017	0.015	12.8	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.114	0.109	4.48	0% - 20%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	0.005	0.005	0.00	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.213	0.207	2.57	0% - 20%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EB1717344-002	Anonymous	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.006	0.006	0.00	No Limit
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1077347)									
EB1717232-023	Anonymous	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.007	0.006	18.2	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.022	0.021	5.53	0% - 50%
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.005	0.005	0.00	No Limit
		EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.007	0.007	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1717344-002	Anonymous	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.021	0.022	5.98	0% - 50%
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.012	0.012	0.00	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.013	0.013	0.00	No Limit

Sub-Matrix: WATER

		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1077347) - continued									
EB1717344-002	Anonymous	EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.006	0.005	0.00	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1077347)									
EB1717232-023	Anonymous	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1717344-002	Anonymous	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1077347)									
EB1717232-023	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit

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: 1077347) - continued									
EB1717232-023	Anonymous	EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit
EB1717344-002	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.00	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.00	No Limit

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: Compound	CAS Number	LOR	Unit	Result	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
							Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1072260)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10 <10	293 mg/L 2000 mg/L	100 93.6	88 88	112 112
ED037P: Alkalinity by PC Titrator (QCLot: 1071303)								
ED037-P: Total Alkalinity as CaCO ₃	---	---	mg/L	---	200 mg/L	97.0	80	120
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA (QCLot: 1075249)								
ED041G: Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 100 mg/L	106 98.1	85 85	118 118
ED045G: Chloride by Discrete Analyser (QCLot: 1075250)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	99.8 97.9	90 90	115 115
ED093F: Dissolved Major Cations (QCLot: 1074158)								
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: 1077347)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.05 µg/L	89.4	60	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.05 µg/L	111	60	130
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.05 µg/L	82.4	60	130
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.05 µg/L	107	60	130
EP231X-LL: Perfluoroctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.05 µg/L	87.8	60	130
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.05 µg/L	100	60	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1077347)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	0.01	0.25 µg/L	71.9	60	130
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.05 µg/L	84.0	60	130
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.05 µg/L	82.6	60	130
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.05 µg/L	99.8	60	130
EP231X-LL: Perfluoroctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.05 µg/L	91.4	60	130
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.05 µg/L	88.0	60	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.05 µg/L	100	60	130
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.05 µg/L	69.6	60	130
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.05 µg/L	79.4	60	130
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.05 µg/L	113	60	130
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.125 µg/L	73.2	60	130



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike	Spike Recovery (%)	Recovery Limits (%)	
					Concentration		LCS	Low
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1077347)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.05 µg/L	70.4	60	130
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.125 µg/L	75.2	60	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.125 µg/L	84.2	60	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.005	µg/L	<0.005	0.125 µg/L	73.0	60	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.125 µg/L	72.8	60	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.05 µg/L	82.2	60	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.05 µg/L	78.6	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1077347)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.05 µg/L	75.0	60	130
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.05 µg/L	98.0	60	130
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.05 µg/L	80.6	60	130
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.05 µg/L	74.8	60	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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1077347) - continued							
EB1717232-024	Anonymous	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.25 µg/L	88.0	30	130
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.05 µg/L	95.8	50	130
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.05 µg/L	98.8	50	130
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.05 µg/L	106	50	130
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.05 µg/L	99.8	50	130
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.05 µg/L	96.4	50	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.05 µg/L	97.8	50	130
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05 µg/L	70.0	50	130
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05 µg/L	72.0	50	130
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05 µg/L	76.2	30	130
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.125 µg/L	95.2	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1077347)							
EB1717232-024	Anonymous	EP231X-LL: Perfluoroctane sulfonamide (FOSA)	754-91-6	0.05 µg/L	82.2	50	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamide (MeFOSA)	31506-32-8	0.125 µg/L	65.8	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamide (EtFOSA)	4151-50-2	0.125 µg/L	82.8	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.125 µg/L	83.1	30	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.125 µg/L	64.2	30	130
		EP231X-LL: N-Methyl perfluoroctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05 µg/L	102	40	130
		EP231X-LL: N-Ethyl perfluoroctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05 µg/L	74.0	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1077347)							
EB1717232-024	Anonymous	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05 µg/L	68.6	50	130
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05 µg/L	60.8	50	130
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05 µg/L	85.4	50	130
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05 µg/L	81.0	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1717249	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MS IMOGEN BIRD	Telephone	: +61-7-3243 7222
Project	: 4130859	Date Samples Received	: 23-Aug-2017
Site	: Gold Coast Airport	Issue Date	: 31-Aug-2017
Sampler	: ANGUS HUGHES, IMOGEN BIRD	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1717165--007	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	---	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method	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) SP18		23-Aug-2017	---	---	---	25-Aug-2017	30-Aug-2017	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) SP18		23-Aug-2017	---	---	---	29-Aug-2017	06-Sep-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) SP18		23-Aug-2017	---	---	---	26-Aug-2017	20-Sep-2017	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) SP18		23-Aug-2017	---	---	---	26-Aug-2017	20-Sep-2017	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) SP18		23-Aug-2017	---	---	---	25-Aug-2017	30-Aug-2017	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-LL) SP18		23-Aug-2017	29-Aug-2017	19-Feb-2018	✓	29-Aug-2017	19-Feb-2018	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-LL) SP18		23-Aug-2017	29-Aug-2017	19-Feb-2018	✓	29-Aug-2017	19-Feb-2018	✓

Matrix: WATER								Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.		
Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231C: Perfluoroalkyl Sulfonamides										
HDPE (no PTFE) (EP231X-LL) SP18		23-Aug-2017	29-Aug-2017	19-Feb-2018	✓	29-Aug-2017	19-Feb-2018	✓		
EP231D: (n:2) Fluorotelomer Sulfonic Acids										
HDPE (no PTFE) (EP231X-LL) SP18		23-Aug-2017	29-Aug-2017	19-Feb-2018	✓	29-Aug-2017	19-Feb-2018	✓		
EP231P: PFAS Sums										
HDPE (no PTFE) (EP231X-LL) SP18		23-Aug-2017	29-Aug-2017	19-Feb-2018	✓	29-Aug-2017	19-Feb-2018	✓		

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	Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
			QC	Regular	Actual	Expected	
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	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	2	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	2	13	15.38	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	19	10.53	10.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	13	7.69	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	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved		ED093F	1	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	13	7.69	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	19	5.26	5.00	✓ NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS		EP231X-LL	1	13	7.69	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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	<p>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)</p> <p>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)</p> <p>Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)</p>
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house



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MR. John 556687 18 Nov 44 AM

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
 Contact name: **Imogen Bird**
 Project name: **GOLD COAST AIRPORT**
 Project ID: **4130859**
 COC number: **Not provided**
 Turn around time: **5 Day**
 Date/Time received: **Aug 1, 2017 4:44 PM**
 Eurofins | mgt reference: **556687**

Sample information

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Imogen Bird - imogen.bird@ghd.com.

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

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: Imogen Bird

Report 556687-W
Project name GOLD COAST AIRPORT
Project ID 4130859
Received Date Aug 01, 2017

Client Sample ID			QA2
Sample Matrix			Water
Eurofins mgt Sample No.			M17-Au00952
Date Sampled			Jul 27, 2017
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnA) ^{N11}	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDaO) ^{N11}	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	80
13C5-PFPeA (surr.)	1	%	69
13C5-PFHxA (surr.)	1	%	83
13C4-PFHpA (surr.)	1	%	103
13C8-PFOA (surr.)	1	%	84
13C5-PFNA (surr.)	1	%	73
13C6-PFDA (surr.)	1	%	62
13C2-PFUnDA (surr.)	1	%	47
13C2-PFDaO (surr.)	1	%	32
13C2-PFTeDA (surr.)	1	%	Q09 INT
Perfluoroalkane sulfonamides (PFASAs)			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	40
D3-N-MeFOSA (surr.)	1	%	26
D5-N-EtFOSA (surr.)	1	%	16

Client Sample ID			QA2
Sample Matrix			Water
Eurofins mgt Sample No.			M17-Au00952
Date Sampled			Jul 27, 2017
Test/Reference	LOR	Unit	
Perfluoroalkane sulfonamides (PFASAs)			
D7-N-MeFOSE (surr.)	1	%	32
D9-N-EtFOSE (surr.)	1	%	25
D5-N-EtFOSAA (surr.)	1	%	51
D3-N-MeFOSAA (surr.)	1	%	53
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPes)	0.01	ug/L	< 0.01
Perfluorohexamersulfonic acid (PFHxS) ^{N11}	0.01	ug/L	No ⁹ 0.01
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	No ⁹ 0.02
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	91
18O2-PFHxS (surr.)	1	%	93
13C8-PFOS (surr.)	1	%	69
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexamersulfonic acid (4:2 FTS) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS) ^{N11}	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS) ^{N11}	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	51
13C2-6:2 FTS (surr.)	1	%	51
13C2-8:2 FTS (surr.)	1	%	42
PFASs Summations			
Sum (PFHxS + PFOS)	0.01	ug/L	0.03
Sum of US EPA PFAS (PFOS + PFOA)	0.01	ug/L	0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.01	ug/L	0.03
Sum of WA DER PFAS (n=10)	0.05	ug/L	< 0.05
Sum of PFASs (n=28)	0.1	ug/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Aug 03, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Aug 03, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Aug 03, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Aug 03, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Aug 1, 2017 4:44 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	556687	Due:	Aug 8, 2017
Project Name:	GOLD COAST AIRPORT	Phone:	08 6222 8222	Priority:	5 Day
Project ID:	4130859	Fax:	08 9429 6555	Contact Name:	Imogen Bird
Eurofins mgt Analytical Services Manager : Robert Johnston					

Sample Detail

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	QA2	Jul 27, 2017		Water	M17-Au00952	X
Test Counts						1

Per- and Polyfluorinated Alkyl Substances (PFASs)

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Method Blank						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05		0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01		0.01	Pass	
Perfluoroctanoic acid (PFOA)	ug/L	< 0.01		0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01		0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01		0.01	Pass	
Perfluorododecanoic acid (PFDoA)	ug/L	< 0.01		0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01		0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01		0.01	Pass	
Method Blank						
Perfluoroalkane sulfonamides (PFASAs)						
Perfluoroctane sulfonamide (FOSA)	ug/L	< 0.05		0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05		0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05		0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05		0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05		0.05	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05		0.05	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05		0.05	Pass	
Method Blank						
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01		0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01		0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01		0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01		0.01	Pass	
Perfluoroctanesulfonic acid (PFOS)	ug/L	< 0.01		0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01		0.01	Pass	
Method Blank						
n:2 Fluorotelomer sulfonic acids						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05		0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01		0.01	Pass	
LCS - % Recovery						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	%	109		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	108		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	110		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	107		50-150	Pass	
Perfluoroctanoic acid (PFOA)	%	112		50-150	Pass	
Perfluorononanoic acid (PFNA)	%	106		50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	115		50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	99		50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	101		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	53		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	97		50-150	Pass	
LCS - % Recovery						
Perfluoroalkane sulfonamides (PFASAs)						

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Perfluorooctane sulfonamide (FOSA)	%	104			50-150	Pass		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	106			50-150	Pass		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	53			50-150	Pass		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	100			50-150	Pass		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	93			50-150	Pass		
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	%	97			50-150	Pass		
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	%	100			50-150	Pass		
LCS - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								
Perfluorobutanesulfonic acid (PFBS)	%	110			50-150	Pass		
Perfluoropentanesulfonic acid (PFPeS)	%	111			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	106			50-150	Pass		
Perfluoroheptanesulfonic acid (PFHpS)	%	112			50-150	Pass		
Perfluoroctanesulfonic acid (PFOS)	%	107			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	68			50-150	Pass		
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	99			50-150	Pass		
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	%	97			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	105			50-150	Pass		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	61			50-150	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)								
Perfluorobutanoic acid (PFBA)	M17-Au01793	NCP	%	110			50-150	Pass
Perfluoropentanoic acid (PFPeA)	M17-Au01793	NCP	%	106			50-150	Pass
Perfluorohexanoic acid (PFHxA)	M17-Au01793	NCP	%	106			50-150	Pass
Perfluoroheptanoic acid (PFHpA)	M17-Au01793	NCP	%	111			50-150	Pass
Perfluoroctanoic acid (PFOA)	M17-Au01793	NCP	%	109			50-150	Pass
Perfluorononanoic acid (PFNA)	M17-Au01793	NCP	%	107			50-150	Pass
Perfluorodecanoic acid (PFDA)	M17-Au01793	NCP	%	105			50-150	Pass
Perfluoroundecanoic acid (PFUnA)	M17-Au01793	NCP	%	101			50-150	Pass
Perfluorododecanoic acid (PFDa)	M17-Au01793	NCP	%	102			50-150	Pass
Perfluorotridecanoic acid (PFTrDA)	M17-Au01793	NCP	%	69			50-150	Pass
Perfluorotetradecanoic acid (PFTeDA)	M17-Au01793	NCP	%	108			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonamides (PFASAs)								
Perfluorooctane sulfonamide (FOSA)	M17-Au01793	NCP	%	106			50-150	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Au01793	NCP	%	108			50-150	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Au01793	NCP	%	67			50-150	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Au01793	NCP	%	108			50-150	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Au01793	NCP	%	99			50-150	Pass
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Au01793	NCP	%	107			50-150	Pass
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Au01793	NCP	%	103			50-150	Pass
Spike - % Recovery								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	M17-Au01793	NCP	%	106			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Au01793	NCP	%	109			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Au01793	NCP	%	112			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Au01793	NCP	%	112			50-150	Pass	
Perfluoroctanesulfonic acid (PFOS)	M17-Au01793	NCP	%	114			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Au01793	NCP	%	80			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids					Result 1				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Au01793	NCP	%	111			50-150	Pass	
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	M17-Au01793	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Au01793	NCP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Au01793	NCP	%	72			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroctanoic acid (PFOA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)					Result 1	Result 2	RPD		
Perfluoroctane sulfonamide (FOSA)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluoroctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluoroctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M17-Au01792	NCP	ug/L	0.01	< 0.01	11	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M17-Au01792	NCP	ug/L	0.05	0.05	1.0	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroctanesulfonic acid (PFOS)	M17-Au01792	NCP	ug/L	0.11	0.12	5.0	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluoroctanesulfonic acid (6:2 FTS)	M17-Au01792	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Au01792	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Some surrogate recoveries were recorded in excess of the QC limit designated in QSM 5.1 of 50-150%. Since no positive results were reported for any PFAS compounds for any of the Samples in this case no data was affected.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	No
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. Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
N11	The Surrogate recovery is outside of the recommended acceptance criteria due to matrix interference. Acceptance criteria were met for all other QC
Q09	

Authorised By

Robert Johnston	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](#).

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Appendix I – Calibration certificates

RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 4.01 / pH 7.00	4.00 pH	7.01 pH	290533 / 292530	<input checked="" type="checkbox"/>
Conductivity	12.88 mS/cm	00 mS/cm	12.89 mS/cm	306044	<input checked="" type="checkbox"/>
TDS	ppk	ppk	ppk		<input type="checkbox"/>
Dissolved Oxygen	Sodium Sulphite / Air	0.0 ppm in Sodium Sulphite	8.74 ppm Saturation in Air	1705243881	<input checked="" type="checkbox"/>

Check only

Redox (ORP) *	Electrode operability test	240mV +/- 10%	238 mV	NL1050 / NL1051	<input checked="" type="checkbox"/>
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* This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199mV to the mV reading.

Battery Status 7.7 V (min 7.2V)
 Electrical Safety Tag attached (AS/NZS 3760)

Temperature 21.5 °C
 Electrodes Cleaned and checked

Tag No: 000121

Valid to: 7/11/17

Date: 25/8/17

Signed: RBLT

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum \$30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
<input checked="" type="checkbox"/>	<input type="checkbox"/>	90FLMV Unit. Ops check/Battery status: 7.7 V
<input checked="" type="checkbox"/>	<input type="checkbox"/>	pH sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conductivity/TDS/Temperature K=10 sensor, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Redox (ORP) sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Power supply 240V to 12V DC 200mA
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Instruction Manual
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Quick Guide
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Bottle with storage solution for pH and ORP sensors
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Carry Case
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check to confirm electrical safety (tag must be valid)

Date: 25/8/17

Signed: RBLT

TFS Reference		Return Date: / /
Customer Reference		Return Time:
Equipment ID	90FLMVBM	Condition on return:
Equipment Serial No.	T8047	

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Phone: (Free Call) 1300 735 295	Fax: (Free Call) 1800 675 123	Email: RentalsAU@Thermofisher.com
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Brisbane Branch
Unit 2/5 Ross St
Newstead 4006

Perth Branch
121 Beringarra Ave
Malaga WA 6090

RENTALS

EQUIPMENT CERTIFICATION REPORT

Sample Pro Micro Purge Low-Flow Bladder Sampling Pump

This Pump has been checked as follows:

Cleaned / checked	Description
<input checked="" type="checkbox"/>	Clean and check all components
Date: <u>28/8/17</u>	
Checked by: <u>ROBERT</u>	
Signature: <u>RBLT</u>	

Please check that the following items are received and all items are returned. Please clean equipment before returning. **A minimum \$30 service/repair charge applies to any unclean or damaged items.**

Sent	Received	Returned	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	QED Sample MicroPurge Pump Serial No: <u>12940</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pump Operating Field Guide laminated
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pump Controller ID: <u>QMP-11</u> Batt Status <u>GOOD</u>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pump Controller Blue Airline Hose
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Blue Airline Hose Quick Connect Fitting for ¼" Airline
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pump Tube & Cap
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hanger Cable S/steel, length <u>70</u> m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hanger Cable Clamp – Black with Orange Tip
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Controller Instructions inside case
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Compressor ID: <u>RENMB</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Comp connecting Hose & Push lock fittings
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gas Bottle CO ₂ ID: _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CO ₂ D Gas Regulator ID: _____ in Carry Case
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CO ₂ D Cylinder Gas Regulator Shift Spanner
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gas Bottle Trolley
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cylinder weight... Without Trolley _____ KG
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Flow Cell ID: _____ With Lid Yes/No
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spare Disposable Bladders, qty _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spare balls, Qty <u>6</u>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spare o-rings, Qty <u>2</u>
			Processors Signature/ Initials

QUOTE NO.: _____
ID: QSP6P-18

CLIENT'S REF:P/O No: _____
CLIENT'S REF:Job No: _____

RETURN DATE: ____ / ____ / ____
TIME: _____

CONDITION ON RETURN : _____

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Brisbane Branch Unit 2/5 Ross St Newstead 4006	Perth Branch 121 Beringarra Ave Malaga WA 6090	

RENTALS

Equipment Report – Solinst Model 122 Interface Meter

This Meter has been performance checked / calibrated* as follows:

Cleaned/Tested**Pass?**

Probe



Tape/Reel

 Performance Test & Battery Voltage Check (9.7 v) 8.0v minimum

Date: 18/8/17 Checked by: ROBERT
Signed: RBLK

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum \$30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operations check OK
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plastic Box / Bag
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spare 9V Battery Qty <u>1</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Probe Cleaning Brush
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Instruction leaflet
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tape Guide
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Processors Signature/ Initials

TFS Quote Reference		Condition on return
Customer Ref		
Equipment ID	SOL122-14	
Equipment serial no.	237650	
Return Date	/ /	
Return Time		

"We do more than give you great equipment... We give you great solutions!"

Phone: (Free Call) 1300 735 295	Environmental Assessment Technologies	Fax: (Free Call) 1800 675 123		
Melbourne Branch 5 Caribbean Drive, Scoresby 3179 Email: RentalsEnviroVIC@thermofisher.com	Sydney Branch Level 1, 4 Talavera Road, North Ryde 2113 Email: RentalsEnviroNSW@thermofisher.com	Adelaide Branch 27 Beulah Road, Norwood, South Australia 5067 Email: RentalsEnviroSA@thermofisher.com	Brisbane Branch Unit 2/5 Ross St Newstead 4006 Email: RentalsEnviroQLD@thermofisher.com	Perth Branch 121 Beringuda Ave Malaga WA 6090 Email: RentalsEnviroWA@thermofisher.com

RENTALS

Equipment Report –12V Compressor

This Compressor has been performance checked as outlined below:

Cleaned/Tested

- Power Leads checked
- Operation Tested to 100psi
- Tank drained

Pass?

-
-
-

Date: 28/8/17

Checked by: ROBERT

Signed: RBLT

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum \$30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Compressor with Power leads
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Instruction Guide
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Transport Case
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1/4" Quick connect / push fit adapter

Options

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Processors Signature/ Initials

TFS Quote Reference		Condition on return
Customer Ref		
Equipment ID	RENMB	
Equipment serial no.		
Return Date	/ /	
Return Time		

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Phone: (Free Call) 1300 735 295	Environmental Assessment Technologies	Fax: (Free Call) 1800 675 123		
Melbourne Branch 5 Caribbean Drive, Scoresby 3179 Email: RentalsEnviroVIC@thermofisher.com	Sydney Branch Level 1, 4 Talavera Road, North Ryde 2113 Email: RentalsEnviroNSW@thermofisher.com	Adelaide Branch 27 Beulah Road, Norwood, South Australia 5067 Email: RentalsEnviroSA@thermofisher.com	Brisbane Branch Unit 2/5 Ross St Newstead 4006 Email: RentalsEnviroQLD@thermofisher.com	Perth Branch 121 Beringarra Ave Malaga WA 6090 Email: RentalsEnviroWA@thermofisher.com

RENTALS

Equipment Certification Report – TPS 90FLT Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 4.01 / pH 7.00	4.02 pH	7.03 pH	290533 / 292530	<input checked="" type="checkbox"/>
Conductivity	12.88 mS/cm	0.0 mS/cm	12.89 mS/cm	299188	<input checked="" type="checkbox"/>
TDS	36 ppk	ppk	ppk		<input type="checkbox"/>
Dissolved Oxygen	Sodium Sulphite / Air	0.0 ppm in Sodium Sulphite	9.3 ppm Saturation in Air	1705243881	<input checked="" type="checkbox"/>
Turbidity	90 NTU	0.0 NTU	90 NTU	299611	<input checked="" type="checkbox"/>
Redox (ORP)**240mV	<input checked="" type="checkbox"/>	Electrode operability test 240mV +/- 10%. Actual: 239 mV			

Battery Status 8.0V (min 7.2V)
 Electrical Safety Tag attached (AS/NZS 3760)

Temperature 19.2 °C
 Electrodes Cleaned and checked

Tag No: 000081
Valid to: 21/9/17
Date: 21/7/17
Signed: RB LT

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum \$30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
<input checked="" type="checkbox"/>	<input type="checkbox"/>	90FLT Unit. Ops check/Battery status: <u>8.0</u> V
<input checked="" type="checkbox"/>	<input type="checkbox"/>	pH sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conductivity/TDS/Temperature K=10 sensor, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Turbidity sensor, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Power supply 240V to 12V DC 200mA
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Instruction Manual
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Quick Guide
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Bottle with storage solution for pH and ORP sensors
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Carry Case
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check to confirm electrical safety (tag must be valid)

Date: 21/7/17
Signed: RB LT

TFS Reference		Return Date: / /
Customer Reference		Return Time:
Equipment ID	90FLTMVTBC	Condition on return:
Equipment Serial No.	U5699 /	

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Phone: (Free Call) 1300 735 295	Fax: (Free Call) 1800 675 123	Email: RentalsAU@Thermofisher.com
Melbourne Branch 5 Caribbean Drive, Scoresby 3179	Sydney Branch Level 1, 4 Talavera Road, North Ryde 2113	Adelaide Branch 27 Beulah Road, Norwood, South Australia 5067

RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 4.01 / pH 7.00	4.02 pH	7.02 pH	290533 / 292530	<input checked="" type="checkbox"/>
Conductivity	12.88 mS/cm	0.0 mS/cm	12.89 mS/cm	299405	<input checked="" type="checkbox"/>
TDS		ppk	ppk		<input type="checkbox"/>
Dissolved Oxygen	Sodium Sulphite / Air	0.0 ppm in Sodium Sulphite	9.18 ppm Saturation in Air	3728	<input checked="" type="checkbox"/>
Check only					
Redox (ORP) *	Electrode operability test	240mV +/- 10%	236 mV	NL1050 / NL1051	<input checked="" type="checkbox"/>

* This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199mV to the mV reading.

Battery Status 8.3 V (min 7.2V)
 Electrical Safety Tag attached (AS/NZS 3760)

Temperature 19.3 °C
 Electrodes Cleaned and checked

Tag No: 000078

Valid to: 14/9/17

Date: 8/8/17

Signed: RBLT

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum \$30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
<input checked="" type="checkbox"/>	<input type="checkbox"/>	90FLMV Unit. Ops check/Battery status: <u>8.3</u> V
<input checked="" type="checkbox"/>	<input type="checkbox"/>	pH sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conductivity/TDS/Temperature K=10 sensor, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Redox (ORP) sensor with wetting cap, 5m
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Power supply 240V to 12V DC 200mA
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Instruction Manual
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Quick Guide
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Bottle with storage solution for pH and ORP sensors
<input checked="" type="checkbox"/>	<input type="checkbox"/>	-Carry Case
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check to confirm electrical safety (tag must be valid)

Date: 8/8/17

Signed: RBLT

TFS Reference		Return Date: / /
Customer Reference		Return Time:
Equipment ID	90FLMVBG	Condition on return:
Equipment Serial No.	T5506	

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Phone: (Free Call) 1300 735 295	Fax: (Free Call) 1800 675 123	Email: RentalsAU@Thermofisher.com		
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Appendix J – Disposal dockets



Waste Transport Certificate

Q 01382328



Part 1 To be completed by the Generator or Storer of waste	Name, Description and Chemical Composition of the Waste SOLID CUTTINGS / EMPTY DRUMS / CONTAMINATED GROUND WATER									
	U.N. Class 9	Subsid Risk .	U.N. Number 3084	Bulk/No of Packaging 4	Type of Packaging LOOSE	Packaging Grp 4				
	Amount of Waste 490		<input checked="" type="radio"/> Litres	<input type="radio"/> Cubic Metres	<input type="radio"/> Kilograms	Physical Nature 5	Waste Code No J120			
	Name of Waste Generator GHD									
	Address where waste was generated EASTERN AVE GOLD COAST AIRPORT									
	Contact Name ANGUS	Phone No. ([REDACTED])	ABN/ACN ([REDACTED])							
	Environmental Authority No (if applicable) ([REDACTED])									
	Local Government Area GOLD COAST									
	Nominated Disposal/Treatment/Storage Facility CLEANAWAY NARANGBA									
	Name of Transporter Company (Cleanaway Liquids Narangba)	Address 26-32 Potassium St, Narangba Q 4504; Ph 07 3293 5555								
Vehicle No 1 Rego No. 256 FKV	Vehicle No/Trailer Rego No. ([REDACTED])	ABN/ACN ([REDACTED])	Postcode ([REDACTED])							
Environmental Authority No. ([REDACTED])	Environmental Authority No. ([REDACTED])	Mode of Transport: <input checked="" type="checkbox"/> Road <input type="checkbox"/> Rail <input type="checkbox"/> Air <input type="checkbox"/> Sea								
I declare that to the best of my knowledge and belief the above information is true and correct (Name and Position) X ANGUS HUGHES ENV. SCIENTIST										
If applicable I am acting as an agent for the Receiver <input type="checkbox"/>										
Signature [Signature]										
Date 18/10/2017										
Part 2 To be completed by the Waste Transporter	I acknowledge the receipt of the waste described in part 1. Discrepancy: <input type="checkbox"/> Waste Type <input type="checkbox"/> Volume received <input type="checkbox"/> Other _____									
	If applicable I am acting as an agent for: <input type="checkbox"/> Generator <input checked="" type="checkbox"/> Receiver									
	Name TROY WARREN									
	Signature [Signature]									
	Phone No. (07) 32935855									
	Date 18/10/2017									
	Name of Receiving Facility ([REDACTED])									
	Address ([REDACTED])									
	Postcode ([REDACTED])									
	ABN/ACN ([REDACTED])									
Disposal/Treatment Code ([REDACTED])										
Physical Nature ([REDACTED])										
Waste Code No ([REDACTED])										
Environmental Authority No. ([REDACTED])										
Amount of Waste ([REDACTED])										
<input type="radio"/> Litres <input type="radio"/> Cubic Metres <input type="radio"/> Kilograms										
If applicable I am acting as an agent for the Generator <input type="checkbox"/>										
I acknowledge the receipt of the waste described in part 1. (Name and Position) ([REDACTED])										
Phone No. ([REDACTED])										
Signature [Signature]										
Date ([REDACTED]) / ([REDACTED]) / ([REDACTED])										
Part 3 To be completed by the Facility Receiving Waste	Discrepancy: <input type="checkbox"/> Waste Type <input type="checkbox"/> Volume Received <input type="checkbox"/> Transporter Details <input type="checkbox"/> Other _____									

WHITE COPY

- TO BE FORWARDED TO EHP BY RECEIVER
 - TO BE FORWARDED TO EHP WITH PARTS 1 & 2 COMPLETED, BY THE PERSON/COMPANY WHO COMPLETED PART 1
 - TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART 1
 - TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART 3
 - TO BE RETAINED BY THE MASTIC TRANSPORTED

BLUE COPY - TO BE RETAINED BY THE WASTE TRANSPORTER
PLEASE FORWARD FHR COPIES (WITHIN 7 DAYS) TO WASTE TRACKING, GPO BOX 2151, BRISBANE, QLD 4001

Pollution Hotline No. 1300 130 372

P 5085572451



Waste Transport Certificate



Q 01382328

Part 1
This section is to be completed by the Generator or Storer of waste

Name, Description and Chemical Composition of the Waste SOLID CLAY NCS YIMPEY DIVISIONS CONTAMINATED GROUND MATERIAL									
U.N. Class 4	Subsid Risk 	U.N. Number 3082	Bulk/No of Packaging 4	Type of Packaging L054	Packaging Grp 11				
Amount of Waste 490		<input checked="" type="radio"/> Litres <input type="radio"/> Cubic Metres <input type="radio"/> Kilograms	Physical Nature S	Waste Code No J12D					
Name of Waste Generator GHD									
Address where waste was generated EAST COAST AVE GOLD COAST AIRPORT Postcode									
Contact Name ANGUS	Phone No.		ABN/ACN						
Environmental Authority No (if applicable)									
Local Government Area GOLD COAST									
Nominated Disposal/Treatment/Storage Facility CLEANAWAY NANANGA									
Name of Transporter Company Cleanaway Liquids Nananga									
Address 26-32 Potassium St, Nananga Q 4504 Ph 07 3293 5555									
ABN 95 066 381 364									
EPA Lic. No EPPF00394113									
Vehicle No 1 Rego No. 256 FKV	Vehicle No/Trailer Rego No. 	ABN/ACN							
Environmental Authority No. 	Environmental Authority No. 	Mode of Transport: <input checked="" type="checkbox"/> Road <input type="checkbox"/> Rail <input type="checkbox"/> Air <input type="checkbox"/> Sea							
I declare that to the best of my knowledge and belief the above information is true and correct (Name and Position) ANGUS HUGHES ENV. SCIENTIST									
If applicable I am acting as an agent for the Receiver <input type="checkbox"/>									
Signature 									
Date 18/10/2017									

Part 2
To be completed by the Waste Transporter

I acknowledge the receipt of the waste described in part 1. Discrepancy: <input type="checkbox"/> Waste Type <input type="checkbox"/> Volume received <input type="checkbox"/> Other _____									
If applicable I am acting as an agent for: <input type="checkbox"/> Generator <input checked="" type="checkbox"/> Receiver Name TROY WHALEY Phone No. (07) 3293 5554									
Signature 									
Date 18/10/2017									

Part 3
To be completed by the
facility Receiving Waste

Name of Receiving Facility 									
Address 									
Postcode 									
ABN/ACN 	Disposal/Treatment Code 	Physical Nature 	Waste Code No 	Discrepancy: <input type="checkbox"/> Waste Type <input type="checkbox"/> Volume Received <input type="checkbox"/> Transporter Details <input type="checkbox"/> Other _____					
Environmental Authority No. 	Amount of Waste 	<input type="radio"/> Litres <input type="radio"/> Cubic Metres <input type="radio"/> Kilograms							
If applicable I am acting as an agent for the Generator <input type="checkbox"/>									
I acknowledge the receipt of the waste described in part 1. (Name and Position) Phone No. () 									
Signature 									
Date / / 									

WHITE COPY
PINK COPY
GREEN COPY
YELLOW COPY
BLUE COPY

- TO BE FORWARDED TO EHP BY RECEIVER
- TO BE FORWARDED TO EHP WITH PARTS 1 & 2 COMPLETED, BY THE PERSON/COMPANY WHO COMPLETED PART 1
- TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART 1
- TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART 3
- TO BE RETAINED BY THE WASTE TRANSPORTER

PLEASE FORWARD EHP COPIES (WITHIN 7 DAYS) TO WASTE TRACKING, GPO BOX 2454, BRISBANE, QLD 4001.

Pollution Hotline No. 1300 130 372



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

ABN 95 066 383 364

GENERATOR: GHD

(Address)

EASTERN AVE
GOLD COAST AIRPORT
COOLANGATTA

PHONE: _____ FAX: _____

CHARGE TO:

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 (\$)
<u>SOIL CUTTINGS</u>									
<u>EM</u>									
Transport of <u>1</u> drums/pallets @ \$ <u>100</u> each									
Labour <u>1</u> hours @ \$ <u>10</u> each									
Material Charges <u>NIL</u>									
Other Charges									

TRANSPORT MANIFEST

MANIFEST #: 30643

WTC Docket #: Q01382328

QUOTE: _____

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: _____

X Generator's Signature: [Signature]

Date: 18/10/17

Driver's Signature: [Signature]

TOTAL CHARGES

Date: 18/10/17
602471010216

Appendix K – Qualitative human health risk assessment



20 September 2017

Craig Barnes
Airservices Australia
Senior Environmental Specialist, ARFFS
Level 6, Alan Woods Building
25 Constitution Avenue
Canberra, ACT, 2601

Our ref: 4130859-82007
Your ref:

Dear Craig

ASA Gold Coast Further Groundwater Investigation Health Risk Assessment

Following receipt of the laboratory reports for the recent spear pump sampling conducted near the Gold Coast Airport, GHD has undertaken a human health risk assessment.

1 Background

A total of eighteen spear pump wells have been sampled from the residential properties along Gold Coast Highway adjacent to the Gold Coast Airport. The spear pump investigation area is shown in Figure 1, Attachment 1.

Anecdotal evidence obtained during sampling suggests that residents primarily use the spear pumps for irrigation of gardens, which includes edible crops.

The groundwater results reported detectable PFAS concentrations, including PFOS, PFHxS, PFOA, PFHxA, PFPeA, PFPeS, PFHpS and PFBS. Tabulated analytical results are presented in Attachment 2.

2 Screening Criteria

Screening criteria for PFAS in water has been published by the Commonwealth Department of Health (DoH, 2017) and are summarised in Table 1.

Draft soil screening criteria for PFAS have been published by NSW OEH (OEH, 2017) and are also presented in Table 1.

Table 1 Summary of PFAS screening criteria

Description	PFOS + PFHxS	PFOA	Comment
Drinking Water (µg/L)	0.07	0.56	DoH 2017
Recreational Water (µg/L)	0.7	5.6	DoH 2017

Description	PFOS + PFHxS	PFOA	Comment
Soil, Low density residential (mg/kg)	0.009	0.1	OEH 2017

3 Assessment of risk

3.1 Water concentration

PFOS+PFHxS measured in the residential spear pumps range from 0.005 µg/L to a maximum reported concentration of 0.151 µg/L. The maximum reported PFOS+PFHxS concentration exceeds the DoH drinking water criterion of 0.07 µg/L but is less than the recreational water criterion of 0.7 µg/L. The recreational water criteria would be protective of children playing under sprinkler systems used for irrigation.

PFOA measured in the residential spear pumps range from <0.002 µg/L to 0.013 µg/L. The maximum reported concentration is below the drinking water criterion.

3.2 Soil concentration

In the environment PFAS is persistent and takes decades to degrade. Consequently, as a result of long term irrigation, mass loading of PFAS may occur in surface soil, which may potentially pose a risk to human health through direct contact with soil and through home-grown produce uptake and consumption.

An estimate of the soil concentration over long term irrigation use of groundwater is presented in Attachment 3. The key assumptions include:

- Based on maximum reported PFAS concentrations.
- Half an inch of water per week (The recommended watering rate is 1 inch of water per week for vegetables and grass during summer months. Half an inch is considered a long term average over summer and winter months and allowing for days with rain).
- 35 years of irrigation.
- Soil mixed within the top 15 cm.
- Sandy soil type.

The resulting soil concentrations were as follows:

- PFOS + PFHxS 16 µg/kg
- PFOA 1.4 µg/kg

3.3 Soil criteria

Draft soil criteria for PFAS has been published by NSW OEH (May, 2017) for low density residential land, which also include 10% consumption of food that is home-grown (as per assumptions for the National Environment Protection Measure, Assessment of Site Contamination (NEPM ASC) (NEPC 2013)).

The estimated soil concentrations (refer to Section 3.2) indicate that PFOS+PFHxS will exceed the acceptable risk level over 35 years of irrigation. That is, 16 µg/kg exceeds criterion of 9 µg/kg.

However, for PFOA, the estimated soil concentration of 1.4 µg/kg is well below the OEH criterion of 100 µg/kg.

While the estimated PFOS concentration exceeds the draft screening criterion, there are some issues with these criteria to note:

- There is an identified issue in the produce uptake equations presented in the NSW OEH derivation. In the derivation of the produce uptake, it states, "The NEPM calculations assume plant concentrations are on a wet basis. Therefore, these transfer factors based on dry plant weight are expected to be conservative". However, the level of conservatism is nearly an order of magnitude:
 - Green vegetables (NEPM assumptions) make up about a third of all produce consumed. OEH have used an uptake factor for lettuce to represent green vegetables. This uptake factor is based on dry weight. When you consider that lettuce is made up of 95% water, the fresh weight basis uptake factor is a factor of 20 overestimated.
 - Tomatoes were used to represent fruit trees (which make up about a third of home-grown produce) and the uptake factor used in the derivation was dry weight basis. Tomatoes are approximately 94% water, and therefore a similar situation occurs for fruit trees.
 - Without home-grown produce, PFAS soil screening criteria for low density residential land are more than an order of magnitude higher, which indicates how significant the home-grown produce pathway is with respect to human health risk.

The OEH criteria assume that 80% of allowable intake levels are from other sources and only 20% of the allowable intake is from contaminated soil. In contamination assessments, consideration of all sources of chemicals with threshold-based toxicity is required. However, studies (Toms et al. 2009, Toms et al. 2014) have shown (through serum measurements) that background levels of PFAS exposure have decreased over the past decade and are now less than 5% of the allowable daily intake, and not 80% as allowed for in the OEH soil criteria.

Based on the above, there is grounds for increasing the OEH screening criteria by a factor of 5 or 10. A soil PFOS+PFHxS criterion of 50 µg/kg would be sufficiently protective of low density residential with home-grown produce. The estimated soil concentration of 16 µg/kg is well below this value.

4 Conclusions

Based on measurements of PFAS in residential spear pumps, it is concluded that the health risk associated with use of groundwater for irrigation use is low and acceptable.

5 References

DoH 2017, *Health Based Guidance Values for PFAS for use in site investigations in Australia*, Australian Government, Department of Health.

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

NSW OEH, *PFAS Screening Criteria (May 2017)*, Draft, NSW Office of Environment and Health.

Toms, L-ML, Calafat, AM, Kato, K, Thompson, J, Harden, F, Hobson, P, Sjodin, A & Mueller, JF 2009, '*Polyfluoroalkyl chemicals in pooled blood serum from infants, children, and adults in Australia*', Environmental science & technology, vol. 43, no. 11, pp. 4194-4199.

Toms, L-M, Thompson, J, Rotander, A, Hobson, P, Calafat, AM, Kato, K, Ye, X, Broomhall, S, Harden, F & Mueller, JF 2014, '*Decline in perfluorooctane sulfonate and perfluorooctanoate serum concentrations in an Australian population from 2002 to 2011*', Environment international, vol. 71, pp. 74-80.

Sincerely



Eric Friebel

Principal Engineer - Health Risk Assessment, Contamination Assessment & Remediation
+61 3 8687 8990

Attachment 1 Spear pump investigation area

Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2017.
 In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
 © The State of Queensland (Department of Natural Resources and Mines) 2017.



1:15,000 (at A4)
 0 100 200 300 400 500 600
 metres

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



NOTE

- Sample locations are indicative only and may vary depending on local conditions and features.
- ** Not sampled



Airservices Australia,
 Gold Coast Airport, Coolangatta, QLD, 4225

Job Number 41-30859
 Revision E
 Date 18 Oct 2017

Further Groundwater Investigations Investigation Locations

Figure 1

Attachment 2 Tabulated analytical results



Spear pump groundwater results

Airservices Australia
Gold Coast Airport
ASA Further Groundwater Investigation

	Field Parameters				Inorganics				PFAS																			
	DO (mg/L) [Field]	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Turbidity (Field)	Total Dissolved Solids (Filtered)	N-Ethyl perfluorooctane sulfonamidoacetic acid	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexapeptide 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	Perfluoropentanoic acid	Perfluorohexane sulfonic acid (PFHxs)	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2-FTS)	Perfluoroctanoic acid (PFOA)	Perfluoropentane sulfonic acid				
	mg/L	µS/cm	pH Units	mV	°C	NTU	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L			
EQL							10	0.002	0.002	0.002	0.005	0.005	0.002	0.136	0.005	0.048	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	0.002	0.001	
FSANZ - PFAS Drinking water quality guideline																		0.07									0.56	
FSANZ - PFAS Recreational water quality guideline																		0.7									5.6	
Site_ID	Location_Code	Sampled_Date_Time																										
Gold Coast Airport	SP1	24/07/2017	5.1	101.8	5.96	76	22.3	-	85	<0.002	<0.002	0.004	<0.005	<0.005	<0.002	0.136	0.005	0.048	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.005	<0.01	
Gold Coast Airport	SP2	24/07/2017	5.68	322.1	5.88	119	21.7	-	154	<0.002	<0.002	0.007	<0.005	<0.005	<0.002	0.134	0.005	0.02	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.013	0.004	<0.01	
Gold Coast Airport	SP3	24/07/2017	5.37	212.5	6.19	71	22.5	-	140	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.016	<0.002	0.009	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.01	
Gold Coast Airport	SP4	24/07/2017	1.42	135.2	5.92	17	22.5	4.4	82	<0.002	<0.002	0.005	<0.005	<0.005	<0.002	0.131	0.002	0.062	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.004	0.004	<0.01	
Gold Coast Airport	SP5	24/07/2017	4.16	150.9	6.03	93	20.7	27.6	107	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.073	0.004	0.038	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.003	0.004	<0.01	
Gold Coast Airport	SP5_tank	25/07/2017	4.16	150.9	6.03	93	20.7	27.6	-	<0.02	<0.02	<0.02	<0.05	<0.05	<0.02	0.05	<0.02	0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	
Gold Coast Airport	SP6	27/07/2017	4	217.4	6.15	-11	-	1	140	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.058	<0.002	0.031	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	0.004	<0.01	
Gold Coast Airport	SP7	27/07/2017	7.37	91.2	6.7	4	20.8	3.1	93	<0.002	<0.002	0.004	<0.005	<0.005	<0.002	0.151	0.007	0.046	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	0.005	<0.01	
Gold Coast Airport	SP8	27/07/2017	7.23	112.8	6.27	270	17.7	1.6	80	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.024	<0.002	0.014	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.002	<0.01	
Gold Coast Airport	SP9	27/07/2017	2.76	226.3	5.95	-69	20.7	24.2	166	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.046	<0.002	0.013	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.004	<0.002	<0.01	
Gold Coast Airport	SP10	27/07/2017	3.79	86.8	5.98	114	20.8	5.7	31	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.045	<0.002	0.018	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	<0.002	<0.01	
Gold Coast Airport	SP11	27/07/2017	5.8	121.2	5.87	146	19	2.6	110	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.029	<0.002	0.014	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	<0.002	<0.01	
Gold Coast Airport	SP12	27/07/2017	2.67	157.4	5.38	168	22.4	15.6	163	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.028	<0.002	0.016	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.003	<0.002	<0.01	
Gold Coast Airport	SP13	27/07/2017	4.19	120.1	6.03	115	21.6	8.4	122	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.016	<0.002	0.008	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	<0.002	<0.01	
Gold Coast Airport	SP14	27/07/2017	5.82	78.4	6.02	154	20.8	1.9	60	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.033	<0.002	0.008	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.002	<0.01	
Gold Coast Airport	SP14H	27/07/2017	5.82	78.4	6.02	154	20.8	1.9	90	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.033	<0.002	0.007	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.004	<0.002	<0.01	
Gold Coast Airport	SP15	28/07/2017	3.06	91.5	5.64	137	21.9	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Gold Coast Airport	SP15a	27/07/2017	1.5	193.6	5.64	86	22	4.5	154	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.017	<0.002	0.006	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	0.003	<0.002	<0.01	
Gold Coast Airport	SP16	10/08/2017	8.3	243	7.91	112	23.2	-	62	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.005	<0.002	0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	<0.002	<0.01	
Gold Coast Airport	SP17	10/08/2017	5.99	121.9	6.33	61	22.9	-	110	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.101	0.003	0.075	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	0.009	<0.01	
Gold Coast Airport	SP18	23/08/2017	-	-	-	-	-	-	194	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	0.009	<0.002	0.007	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.01	

Spear pump groundwater results

	PFAS Analytes												Acidity & Alkalinity		Major Ions									
	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluoroheptanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (FOOSA)	Perfluorooctane sulfonamide (FOOS)	Perfluorooctanoic acid	Perfluorotetradecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total) (MA DER List)	Alkalinity (Carbonate as CaCO ₃)	Alkalinity (Hydroxide as CaCO ₃)	Alkalinity (total as CaCO ₃)	Bicarbonate Alkalinity as CaCO ₃	Sulfate as SO ₄ - Turbidimetric (Filtered)	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Potassium (Filtered)	Anions Total	Sodium (Filtered)	Cations Total
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	
EQL	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.161	0.069	<1	<1	17	17	5	6	13	2	0.81	1	9	0.88
FSANZ - PFAS Drinking water quality guideline													<1	<1	7	7	19	11	28	2	1.32	1	24	1.78
FSANZ - PFAS Recreational water quality guideline													<1	<1	22	22	4	6	48	2	1.88	2	28	1.73

Site_ID	Location_Code	Sampled_Date_Time	PFAS Analytes												Acidity & Alkalinity		Major Ions									
			Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluoroheptanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (FOOSA)	Perfluorooctane sulfonamide (FOOS)	Perfluorooctanoic acid	Perfluorotetradecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total) (MA DER List)	Alkalinity (Carbonate as CaCO ₃)	Alkalinity (Hydroxide as CaCO ₃)	Alkalinity (total as CaCO ₃)	Bicarbonate Alkalinity as CaCO ₃	Sulfate as SO ₄ - Turbidimetric (Filtered)	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Potassium (Filtered)	Anions Total	Sodium (Filtered)	Cations Total
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	meq/L	
Gold Coast Airport	SP1	24/07/2017	<0.002	<0.002	<0.002	0.004	<0.002	0.088	<0.002	<0.005	<0.002	<0.002	0.161	0.069	<1	<1	17	17	5	6	13	2	0.81	1	9	0.88
Gold Coast Airport	SP2	24/07/2017	<0.002	<0.002	<0.002	0.002	0.114	<0.002	<0.005	<0.002	<0.002	<0.002	0.165	0.044	<1	<1	7	7	19	11	28	2	1.32	1	24	1.78
Gold Coast Airport	SP3	24/07/2017	<0.002	<0.002	<0.002	<0.002	0.007	<0.002	<0.005	<0.002	<0.002	<0.002	0.016	0.009	<1	<1	22	22	4	6	48	2	1.88	2	28	1.73
Gold Coast Airport	SP4	24/07/2017	<0.002	<0.002	<0.002	0.007	<0.002	0.069	<0.002	<0.005	<0.002	<0.002	0.153	0.079	<1	<1	16	16	2	5	22	2	0.98	<1	12	0.94
Gold Coast Airport	SP5	24/07/2017	<0.002	<0.002	<0.002	0.004	<0.002	0.035	<0.002	<0.005	<0.002	<0.002	0.088	0.053	<1	<1	14	14	15	8	44	2	1.83	1	13	1.15
Gold Coast Airport	SP5_tank	25/07/2017	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.02	0.05	0.05	-	-	-	-	-	-	-	-	-	-	-	-
Gold Coast Airport	SP6	27/07/2017	<0.002	<0.002	0.002	0.004	<0.002	0.027	<0.002	<0.005	<0.002	<0.002	0.077	0.05	<1	<1	15	15	3	8	44	3	1.6	3	24	1.77
Gold Coast Airport	SP7	27/07/2017	<0.002	<0.002	0.002	0.006	<0.002	0.105	<0.002	<0.005	<0.002	<0.002	0.183	0.074	<1	<1	18	18	11	8	13	2	0.96	2	10	1.05
Gold Coast Airport	SP8	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.01	<0.002	<0.005	<0.002	<0.002	<0.002	0.031	0.021	<1	<1	21	21	7	4	16	<1	1.02	<1	16	0.9
Gold Coast Airport	SP9	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.033	<0.002	<0.005	<0.002	<0.002	<0.002	0.017	0.017	<1	<1	16	16	4	5	50	4	1.81	1	30	1.91
Gold Coast Airport	SP10	27/07/2017	<0.002	<0.002	0.002	0.004	<0.002	0.027	<0.002	<0.005	<0.002	<0.002	0.062	0.035	<1	<1	7	7	8	6	12	<1	0.64	<1	9	0.69
Gold Coast Airport	SP11	27/07/2017	<0.002	<0.002	0.004	0.004	<0.002	0.015	<0.002	<0.005	<0.002	<0.002	0.049	0.034	<1	<1	7	7	14	6	16	2	0.88	2	12	1.04
Gold Coast Airport	SP12	27/07/2017	<0.002	<0.002	<0.002	0.002	<0.002	0.012	<0.002	<0.005	<0.002	<0.002	0.033	0.021	<1	<1	2	2	20	8	20	2	1.02	2	13	1.18
Gold Coast Airport	SP13	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.008	<0.002	<0.005	<0.002	<0.002	<0.002	0.018	0.01	<1	<1	16	16	10	6	16	2	0.98	1	13	1.06
Gold Coast Airport	SP14	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.025	<0.002	<0.005	<0.002	<0.002	<0.002	0.038	0.013	<1	<1	7	7	5	6	14	1	0.64	<1	7	0.69
Gold Coast Airport	SP14H	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.026	<0.002	<0.005	<0.002	<0.002	<0.002	0.037	0.011	<1	<1	8	8	5	6	14	1	0.66	<1	8	0.73
Gold Coast Airport	SP15	28/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Gold Coast Airport	SP15a	27/07/2017	<0.002	<0.002	<0.002	<0.002	0.011	<0.002	<0.005	<0.002	<0.002	0.02	0.009	<1	<1	5	5	14	6	43	2	1.6	<1	27	1.64	
Gold Coast Airport	SP16	10/08/2017	<0.002	<0.002	<0.002	0.002	<0.002	0.005	<0.002	<0.005	<0.002	<0.002	0.009	0.004	<1	<1	4	4	4	7	9	<1	0.42	<1	6	0.61
Gold Coast Airport	SP17	10/08/2017	<0.002	<0.002	<0.002	0.009	<0.002	0.026	<0.002	<0.005	<0.002	<0.002	0.127	0.101	<1	<1	12	12	8	6	20	1	0.97	<1	13	0.95
Gold Coast Airport	SP18	23/08/2017	<0.002	<0.002	<0.002	0.003	<0.002	0.002	<0.002	<0.005	<0.002	<0.002	0.022	0.02	<1	<1	11	11	43	12	47	5	2.44	5	30	2.44

Attachment 3 Soil concentration estimate

Attachment 3 Soil Concentration Estimate

Parameter	Value	Units	Comments
PFOS+PFHxS water conc	0.151	ug/L	max reported
Irrigation water rate	1.815	L/day/m ²	1 inch per week, http://ucanr.edu/sites/scmg/files/185639.pdf
Duration	35	years	NEPM Residential
Mass (total) PFAS	3501.18	ug/m ²	
Total porosity	0.38		Sandy soil
Soil mixing depth	0.15	m	15cm, top soil
Volume soil	0.15	m ³ /m ²	
Volume solid	0.093	m ³ /m ²	solid porosity x volume
Particle density	2.4	t/m ³	
Mass soil (dry weight)	223.2	kg/m ²	
PFAS soil conc	15.7	ug/kg	

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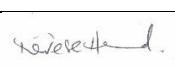
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Document Status

Revision	Author	Reviewer		Approved for Issue		
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