Ongoing Monitoring Report (November 2022 – October 2023)

Naval Communication Station Harold E Holt Area A - PFAS OMP

Prepared for
Department of Defence

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Executive Summary

Introduction

Cardno, now Stantec (Cardno), were engaged by the Australian Department of Defence ("Defence") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan[1] (OMP) (Defence, 2019a) at and around Naval Communication Station Harold E Holt – Area A ("HEH-A" or the "site") on the North West Cape, Western Australia (WA) (Figure 1, Appendix A).

The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, seepage water, surface water and sediment originating from the source areas identified at HEH-A. The source areas are depicted in Figure 2, Appendix A

The ongoing monitoring program consists of biannual monitoring events in November and June, as well as a 'first flush' surface water and sediment monitoring event conducted immediately (or as close as possible) following the first heavy rainfall event of the wet season. The OMP includes sampling and analysis not only from the site but also from surrounding (off-site) waterways. The site and these surrounding areas are collectively referred to as the 'Management Area', which was identified during a Detailed Site Investigation[2] (DSI) in 2018 (GHD, 2018). The Management Area is shown in Figure 2, Appendix A.

Objectives

The ongoing monitoring program aims to assess changes in the nature and extent of PFAS within the environment. The ongoing monitoring program uses the monitoring network developed as part of the PFAS Management Area Plan[3] (PMAP) (Defence, 2019b) to monitor the amount of PFAS leaving the site through the groundwater migration and surface water runoff. The PMAP documents ways to manage potential risks to receptors (for example, to people or the environment) associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

Monitoring Scope

The November 2022 – October 2023 monitoring period consisted of biannual monitoring events (November 2022 and June 2023). The scope of work for the biannual monitoring events comprised monitoring of 31 groundwater wells, 11 seepage water locations and six co-located sediment and surface water locations (two surface water samples were collected in June 2023 when surface water was present), as specified in the OMP. During the November 2022 – October 2023 monitoring period insufficient rainfall occurred during the wet season and a first flush sampling event could not be completed.

Groundwater elevation data was collected from 30 groundwater wells in the November 2022 monitoring event and 31 groundwater wells during the June 2023 monitoring event.

Works were conducted in accordance with the methodologies detailed in the Sampling and Analysis Quality Plan (SAQP) (Cardno, 2023c, Appendix B), except as summarised in Section 3.6 of this report.

The current monitoring network, targeting source areas and migration pathways, is considered adequately positioned for monitoring PFAS in groundwater, seepage water, surface water runoff, and sediment, to provide an early detection of significant changes in PFAS migration.

Groundwater Results

Groundwater Flow Direction

The local groundwater (GHD, 2018) was observed to flow inland from the site, with a seaward flow closer to the coast, likely due to increased recharge in the sand dunes. A tidal influence was also reported at most wells. It is noted that the groundwater level measurements were collected over several days and tide cycles during November 2022 and June 2023, which limits the conclusions that can be drawn about tidal influence on groundwater elevation. The inferred groundwater elevation contours indicated a groundwater flow

[1] The OMP is publically available at www.defence.gov.au/Environment/PFAS/Iharoldeholt, and is found as Attachment 1 of the PFAS Management Area Plan
[2] Publically available at www.defence.gov.au/Environment/PFAS/haroldeholt
[3] Defence, 2019, Naval Communication Station Harold E Holt – Ara A – PFAS Management Area Plan.

direction from the sand dunes towards the central clay pan area (i.e. inland direction). Minimal seasonal differences were observed in groundwater depth due to a lack of rainfall across both monitoring events, resulting in reduced groundwater recharge than usually observed in winter. However, the interpreted groundwater flow direction remains consistent with previous monitoring events and the DSI findings.

PFAS Concentrations

The groundwater results recorded during the monitoring period were consistent between monitoring events and remained within the same order of magnitude as historical data.

The greatest PFAS concentrations were reported at MW119 and MW017, downgradient of the Petrol Oil and Lubricants (POL) Storage Area and Powerhouse Area (source areas). These wells reported exceedances of the Heads of EPAs Australia and New Zealand (HEPA) (2020) recreational use criteria, consistent with historical results. New maximum Per-FluoroOctane Sulfonate (PFOS) and Sum of PFOS and Per-FluoroHexane Sulfonate (PFHxS) (PFOS+PFHxS) concentrations were reported at POL Storage Area monitoring wells MW210 and MW212. A new exceedance of the recreational use criteria was reported at Powerhouse monitoring well MW027. However, the concentrations were within the same order of magnitude as the historical maximums.

What is an 'order of magnitude'?

This refers to something decreasing or increasing by multiples of ten. For instance, an increase from 10 to 100 is an order of magnitude increase. When assessing changes in PFAS concentrations at an individual location, all concentrations are considered when determining trends, but order of magnitude changes are discussed separately as they represent a significant change in concentrations from what was reported in the previous event.

If a change is close to established health or environmental criteria, it will also be considered significant.

Trend interpretation of PFAS concentrations (using Mann-Kendall analysis) showed that source area wells displayed either a decreasing, stable, or absent trend depending on the compound under review, except for MW119 and MW210 (POL Storage Area), which displayed an increasing trend for PFOS and a possibly increasing trend for PFOA, respectively.

All pathway monitoring wells (i.e. between the source areas and the marine receptor) reported PFAS below the laboratory limit of reporting (LOR), except pathway wells MW107 (west of Powerhouse) and MW111 (POL pathway), which reported PFOS and PFOS+PFHxS marginally above the LOR in June 2023. The detected concentrations were reported within the historical range. There were no first-time detections or new exceedances of PFAS at any of the pathway monitoring locations.

The PFAS concentrations appear to be slowly diluting due to rainfall recharge and groundwater migration, and concentrations become undetectable (i.e., below LOR) before reaching the marine environment.

What is a 'limit of reporting'?

The limit of reporting (LOR) is the lowest concentration level that the laboratory can measure in a sample with a reasonable degree of certainty. Where monitoring shows <LOR, it means that if PFAS is present in the sample it is too low for the laboratory to measure with any degree of certainty.

Seepage Water Results

Seepage water is groundwater that is moving to the surface (with groundwater flow and tide effect mechanisms). Monitoring seepage water provides data to assess the potential risk of PFAS migrating to the Exmouth Gulf environment. All seepage water monitoring locations reported PFAS concentrations below the laboratory LOR during the monitoring period, which is consistent with historical results. Considering this and the dilution factor when reaching the Exmouth Gulf, the potential risk remains low and acceptable.

Surface Water Results

Due to less than average rainfall experienced during the monitoring period and the lack of a first flush event, all surface water locations were dry and unable to be sampled except for SW113 and SW128 in June 2023. SW113, located within the Powerhouse Area, reported PFAS concentrations above the LOR, consistent with historical results. No first-time detections of PFOA, PFOS+PFHxS, or new guideline exceedances were reported during the monitoring period.

Sediment Results

Sediment results were below the laboratory LOR for all locations with the exception of SD113 (within the Powerhouse Area), which consistently reports PFAS above the LOR and SD128 (located to the south of the Management Area), which reported first-time detections of PFOS and PFOS+PFHxS in June 2023. It is considered that the first-time detection at SD128 is a potential outlier/error due to the following lines of evidence:

- The reported concentration is within the same order of magnitude as the LOR,
- SD128 is located a significant distance from the source areas,

- Sediment samples located between the source areas and SD128 (SD126, SD131 and SD127) did not report PFAS above the LOR, and
  - The co-located surface water sample, SW128, did not report PFAS above the laboratory LOR.

The sediment PFAS results and the absence of rainfall and surface water during the monitoring period, suggest surface water was not the main pathway/transport mechanism for PFAS migration from the source areas in November 2022 – October 2023. The next OMP monitoring event (November 2023) will confirm whether PFAS is present at SD128, or if the June 2023 result is an outlier.

Risk Summary

The evaluation of November 2022 – October 2023 monitoring results indicates the nature and extent of PFAS in groundwater, seepage water, surface water and sediment remain consistent with that inferred from previous investigations. The potential exposure pathways, human receptors (recreational anglers in the Management Area), and ecological receptors (land and marine flora and fauna) identified during the DSI (GHD, 2018) have been reviewed and are still considered to be appropriate. The ongoing monitoring program data collected during the monitoring period does not suggest any significant changes to these transport mechanisms or risks.

Information gathered during the monitoring period supports the conclusions made in the Environmental Risk Assessment (ERA) (GHD, 2019), that PFAS poses a low risk to receptors (such as recreational anglers and land and marine flora and fauna).

The OMP contains management response triggers to assess whether a more active response is required to manage changes in PFAS. There were no management response triggers reported during the monitoring period. Potential changes in groundwater, surface water, seepage water and sediment PFAS concentrations will continue to be evaluated through future monitoring and reporting.

Conclusions

The nature and extent of PFAS across all OMP monitoring locations has not changed from the understanding presented in the investigation phases, PMAP (Defence, 2019), previous 2022 Ongoing Monitoring Report (Cardno, 2024) and 2021 and 2020 Annual Interpretive Reports (Cardno, 2021d and Cardno 2023b). Potential trends in PFAS concentrations (both decreasing and increasing depending on the location and compound under review) are noted at some groundwater monitoring locations within the on-site source areas. The PFAS concentrations appear to be slowly diluting due to rainfall recharge and groundwater migration and concentrations become undetectable (i.e., below LOR) before reaching the marine environment.

The November 2022 – October 2023 monitoring results met the objective of the OMP, and monitoring was carried out in accordance with the SAQP (Cardno, 2023c, Appendix B). Based on the current available data there is no significant change to the risk profile of the Management Area that would trigger the need for an OMP review or further management actions.

Given the persistent PFAS concentrations reported at the monitoring locations within the source areas, the ongoing monitoring program will continue to further support temporal data trend assessment, PFAS concentration behaviour and assess potential changes in exposure pathways and associated risk.

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Chemical Names

DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluorohexane Sulphonate
PFOA	Per-fluorooctanoic Acid
PFOS	Per-fluorooctane Sulfonate
TDS	Total Dissolved Solids (salinity of water)

Technical Terms & Abbreviations

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
AST	Above ground Storage Tanks
CS	Contaminated Sites
CSM	Conceptual Site Model
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
HEPA	Heads of Environmental Protection Authority
LOR	Limit of Reporting
NEPC	National Environment Protection Council
NEMP	National Environmental Management Plan
OMR	Ongoing Monitoring Report
QA	Quality Assurance
QC	Quality Control
SAQP	Sampling and Analysis Quality Plan
SWL	Standing Water Level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mAHD	Metres Above Height Datum
mbTOC	Metres Below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µg/L	Microgram per Litre
mV	Millivolt
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Report
PMAP	PFAS Management Area Plan
POL	Petrol oil and lubricants
RUFF	Ready Use Fuel Farm
VLF	Very low frequency

1 Introduction

The Australian Department of Defence (”Defence”) engaged Cardno, now Stantec (Cardno) to undertake the November 2022 and June 2023 biannual groundwater, surface water, seepage water and sediment monitoring events at and around the Naval Communication Station Harold E Holt – Area A (‘HEH-A’ or the ‘site’) as part of the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) (Defence, 2019a).

1.1 Background

The OMP outlines the rationale and scope for monitoring the concentrations and extent of PFAS in groundwater, seepage water, surface water, and sediment originating from the site. The ongoing monitoring program consists of biannual monitoring events in November and June, as well a ‘first flush’ surface water and sediment monitoring event conducted immediately (or as close as possible) following the first heavy rainfall event of the wet season.

The site has been subject to numerous PFAS investigations, including:

- A Detailed Site Investigation (GHD, 2018).
- An Ecological Risk Assessment (GHD, 2019); and
- Implementation of the PFAS OMP since 2019.

1.2 Purpose & Objectives

The specific objectives of the monitoring specified in the OMP are to:

- Evaluate the nature and extent (spatial and temporal) of PFAS impact in groundwater and surface water pathways associated with site sources of PFAS derived from historical use of Aqueous Film-Forming Foam (AFFF);
- Monitor the migration of PFAS in groundwater and surface water from the site;
- Provide confirmation of the current understanding of risk; and
- Provide supporting data for assessment of management actions, where relevant.

The purpose of the Ongoing Monitoring Report (OMR) is to:

- Inform Defence and key stakeholders of PFAS trends in groundwater, seepage water, surface water and sediment; and
- Assess any variations in the site's PFAS distribution and how this affects understanding of the Conceptual Site Model (CSM) and risk profile.

1.3 Scope of Work

The OMP was carried out in accordance with the scope and limitations presented in Cardno’s Sampling and Analysis Quality Plan (SAQP)[4], provided in Appendix B and the SAQP deviations outlined in Section 3.6.

The assessment included the following main components:

1. Undertake the November 2022 groundwater, seepage water, surface water[5] and sediment monitoring event:
   - Gauging of 30 single and multi-level groundwater monitoring wells.

[4] Cardno, June 2023, Reference: DEF19009, ‘PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A’.

[5] All surface water monitoring locations were found dry during November 2022.

- Sampling of 30 groundwater monitoring wells,
- Sampling 11 seepage water locations; and
- Sampling of six sediment locations.

2. Undertake the June 2023 groundwater, seepage water, surface water and sediment monitoring event:
   - Gauging of 31 single and multi-level groundwater monitoring wells.
   - Sampling of 29 groundwater monitoring wells,
   - Sampling of 11 seepage water locations.
   - Sampling of two surface water locations; and
   - Sampling four sediment locations.
3. Data assessment and reporting for the November 2022 – October 2023 monitoring period.

1.4 Standards of Assessment and Limitations

This OMR has been prepared in accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report.

This report is not any of the following:

> A Mandatory Audit Report (MAR) or Voluntary Audit Report (VAR) as defined under the *Contaminated Sites Act 2003* (CS Act).

> A Geotechnical Assessment.

> A Detailed Site Investigation (DSI).

> A Detailed Hydrogeological Assessment.

> A Remediation Action Plan (RAP) or Site Remediation & Validation (SRV) report.

> A Site Management Plan (SMP).

2 Site Setting

HEH-A is situated on the North West Cape in the Pilbara Region of Western Australia (WA), approximately 14 kilometres (km) north of the township of Exmouth and 1,250 km north of Perth. The site covers an area of approximately 2,310 hectares (ha) and is presented in Figure 1 of Appendix A. HEH-A was established in 1967 and is host to a Very Low Frequency (VLF) antenna field and associated infrastructure including a central transmitter building, power station, fuel farms, fuel pipelines, Point Murat Pier, and saltwater bore field.

The site encompasses the waters extending 400 m around the Point Murat Pier. The majority of the buildings and associated infrastructure and support services are located in the eastern portion of the site and include:

- VLF transmitter Station.
- Bulk fuel storage, referred to as the Petrol Oil Lubricants (POL) Storage Area.
- Bulk fuel storage at the Ready Use Fuel Farm (RUFF) Above ground Storage Tanks (ASTs) at the power station.
- Point Murat Pier – diesel fuel supplied by ships berthed at Point Murat Pier and transferred via pipeline (above and below ground) to the POL and ready storage facility adjacent to the power station; and
- Power station.

2.1 Site Definition and Planning

The site location is presented in Figure 1, Appendix A. Key site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Site Address	Murat Rd, North West Cape, WA 6707
Land Description	Harold E Holt Area A
Owner	Commonwealth of Australia
Title Details	Lot 44 on Plan P209471
Planning Zone / Land use	Public Purposes – Government Services / Naval Communication Station
Local Government Authority (LGA)	Shire of Exmouth
Boundary corner coordinates (as determined by Cardno**)** (eastings and northings in GDA94, Zone 50)	▪ North corner: 201,817 mE, 7,588,922 mN ▪ East corner: 209,638 mE, 7,585,003 mN ▪ South corner: 206,410 mE, 7,581,168 mN ▪ West corner: 203,378 mE, 7,585,914 mN

Source: GHD Pty Ltd (December 2018) Naval Communication Station Harold E Holt – Area A, PFAS Investigations – DSI Report (GHD 2018)

2.2 Surrounding Land Uses and Zoning

The surrounding land uses are outlined in Table 2-2.

Table 2-2 Surrounding Land Uses

Direction	Land Use
North	Ningaloo Marine Park / Indian Ocean
West	Ningaloo Marine Park / Indian Ocean
East	Ningaloo Marine Park / Exmouth Gulf, used for commercial aquaculture (prawn fishing)
South	▪ Bundegi Coastal Park and vacant crown land (open space) ▪ Harold E Holt – Area B ▪ Exmouth Township

2.3 Monitoring Area Description

The site boundary is presented in Figure 1 of Appendix A. The OMP includes sampling of groundwater and surface water not only from within the site boundary, but also from surrounding (off-site) waterways, groundwater wells and seepage locations. The site and these surrounding areas are collectively referred to as the 'Management Area'. The Management Area in the HEH-A PFAS Management Area Plan (PMAP) (Defence, 2019) includes the source areas and the land surrounding the site to the coastline and is presented in Figure 2, Appendix A.

2.4 Environmental Setting

Key details defining the site are summarised in Table 2-3.

Table 2-3 Key Site Details

Setting	Description
Climate	The region has a hot, semi-arid climate, with a wet and dry season. The maximum temperatures range between 38ºC (January) and 24.4ºC (July) while minimum temperatures range between 11.4ºC (July) and 24.1ºC (February) [Bureau of Meteorology (BoM), 2024]. Rainfall occurs generally between January and July with monsoonal showers between January and late April. August to December is generally dry. The highest volume of rainfall typically occurs during the month of June with a mean monthly rainfall amount of 43.5 mm. The monthly rainfall amounts for the monitoring period were below average.
Topography	Elevation across HEH-A typically range between 1 and 20 metres relative to the Australian Height Datum (mAHD). To the east of HEH-A, the coastline is comprised of sand dunes, which have a maximum elevation of 20 mAHD. The dunes have a succession profile of primary and secondary dunes, which increase in elevation with distance from the coast.
Geology	**Regional Geology** The site is underlain by the geological units of the North-West Cape Range primarily comprising carbonate sediments. The Cape Range Group consists of: ▪ Trealla Limestone: permeable, hard, and tightly jointed limestone beneath unconsolidated Quaternary deposits. Contains both karst areas and areas of recrystallization. ▪ Tulki Limestone: relatively permeable, hard, and tightly jointed. Encountered at depths of 50 to 100 m below ground level (mBGL). Karst features such as caves occur within the recrystallised limestone. ▪ Mandu Limestone: low permeability limestone encountered at greater than 150 mBGL. ▪ The Birdrong Sandstone which underlies the Cape Range Group, is an Early Cretaceous geologic formation of the Barrow Group. Comprising a fine to coarse grained silty sandstone. **Site Specific Geology** Previous environmental investigations have reported that the geology at HEH-A is primarily a clay pan, comprising silt, sand, and gravels (GHD, 2018). The clay pan encompasses most of the far north-eastern tip of the peninsula and is fringed along the coast to the north and east of the site by extensive beach and coastal dunes. The lithology encountered during the DSI was as follows: – Clay Pan: the central clay pan comprised a thin surface clay layer with some sand and gravels underlain by silt to at least 5 mBGL. The rim of the clay pan consisted of a sandy top layer underlain by clay and/or gravelly sands. – Coastal zone: the coastal zone comprised well graded sand to approximately 10 mBGL.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates that most of the area encompassing the site is classified as having either a high to moderate, or moderate to low risk of ASS occurring.

Setting	Description
Hydrology	HEH-A can be inundated by sea water during extreme storm surges. Later evaporation of this water has left visible salt crusts and localised hypersaline conditions. The coastal sand dunes and inland topographical depression that characterise HEH-A effectively form a basin where, in the absence of drainage pathways to the coast, surface water can stand for up to several months following substantial rainfall events and storm surges. Site drainage primarily follows the local topography, prior to infiltration into the ground surface. The drainage lines are ephemeral, flowing with high amounts of seasonal rainfall.
Hydrogeology	The Quaternary and Tertiary-aged sediments are hydraulically interconnected and together form the major, unconfined aquifer of the area. The superficial Quaternary layers (dunes, colluvium, alluvium) are no more than 20 m in thickness. ▪ **Groundwater Occurrence/Quality** – The main regional aquifer occurs predominantly within the Tulki Limestone (within permeable beds and the karst system) on the flanks of the Cape Range and the Mandu Limestone (within joints and minor permeable beds) on the crest of the Cape Range. The aquifer is unconfined and is recharged by rainfall. Groundwater in the Quaternary units is considered to be perched and discontinuous. The coastal dunes may also contain relatively fresh groundwater, however of limited extent (lenses), but may influence groundwater flow directions locally. The groundwater underlying the clay/salt pan is hypersaline due to the clay pan acting as an evaporation basin where salts are concentrated. Brackish groundwater conditions exist around the power station and POL storage areas, which may indicate an interaction with fresher recharge source. ▪ **Depth to Groundwater** – During the 2018 DSI, the majority of existing groundwater monitoring wells reported groundwater less than 7 m BGL. The hydraulic gradient of the site is low (in the order of 0.0002 to 0.003 m/m [GHD, 2018]). The groundwater is therefore likely to be vulnerable to local changes in flow direction through preferential recharge. Recharge is limited to rainfall infiltration and occasional sea water flooding. Groundwater has been recorded beneath the site at shallow levels between 0.031 mAHD and 1.039 mAHD (approximately 1.71 to 9.90 mBGL) during the November 2022 monitoring event and between -0.04 m AHD and 2.384 mAHD (approximately 1.66 to 9.68 mBGL) during the June 2023 monitoring event. ▪ **Groundwater Flow Direction** – The installation of data loggers during the DSI (GHD, 2018) found the flow of groundwater across the Management Area was generally inland rather than towards the coast, with exception of periods of consistent flooding (i.e., cyclonic events). The DSI determined that a tidal influence was visible at most wells with a consistent flow over tidal periods. Data loggers indicated a seaward groundwater flow closer to the coast, likely due to recharge from the coastal dunes. The November 2022 and June 2023 inferred groundwater elevation contours indicated a generally consistent groundwater flow direction from the sand dunes towards the central clay pan area (i.e., inland direction). Figure 4 and Figure 5 of Appendix Ashow the groundwater levels and flow direction recorded during the November 2022 and June 2023 monitoring events, respectively. ▪ **Groundwater Use** – No registered groundwater bores were identified within a 1.0 km radius of HEH-A. A number of unregistered extraction bores are understood to be present at residential properties within the township of Exmouth, located approximately 14 km south of the site. Saltwater production bores were installed within the Trealla Limestone to the south-east of the power plant compound area. Groundwater is continuously pumped from this borefield, which may be responsible for localised deviations in the groundwater elevation contours near the south-east portion of the site. ▪ **Protective Drinking Water Source Area (PDWSA**) – The site is not located within a PDWSA. However, the Exmouth Water Reserve, which is a Priority 1 PDWSA, is located approximately 12 km south-west of the site at its closest point. Priority 1 areas are usually undeveloped and under state management. ▪ **Receiving Surface Water Body** – A component of flow from the sand dunes towards the coast is present on the eastern coast near Point Murat Pier, although this is reversed at high tide, such that groundwater discharges over full tidal cycles may be minimal.

Setting	Description
Environmental Sensitive Areas	The site occurs within an area that is included on the Register of the National Estate because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth. ▪ The Cape Range Subterranean Waterways wetlands occurs across the site. ▪ The Cape Range National Park is located approximately 28 km to the south-west of the site at its closest point. ▪ The Jurabi Coastal Park is adjacent to the west of the site. ▪ The Bundegi Conservation Reserve is adjacent to the south-east of the site. The Ningaloo Reef, a World Heritage listed site is located within 10 km of HEH-A. The Ningaloo Reef is also listed on the National Heritage Property register.

Further information can be found in the DSI report (GHD, 2018) and previous interpretive reports (Cardno, 2023), (Cardno, 2022) and (Cardno, 2021).

2.5 Source Areas

There are three monitoring areas, known as source areas, where PFAS was detected in soil or groundwater at concentrations exceeding the adopted assessment levels. These include (as shown in Figure 2 of Appendix A):

> The POL Storage Area (or Fuel Farm).

> The Powerhouse; and

> Point Murat Pier.

The extent of contamination identified during the DSI and ERA indicates that "*PFAS concentrations in groundwater were generally low across the site, with higher concentrations in the immediate vicinity of the bulk fuel storages at the POL Storage Area and the Power Station*" (Defence, 2019).

2.6 Pathway Areas and Broader Area

The Pathway Areas are monitored to provide a confirmation of the overall PFAS impact identified in the DSI (GHD, 2018) and provide an indication of the potential migration of PFAS concentrations from the source areas. Assessment of changes in PFAS concentrations and distribution in the main migration pathways allows for early detection of significant changes in migration enabling contingencies to be put in place.

The Broader Area wells are sampled to assess the presence of PFAS concentrations in the wider environment, outside the site operational areas. These wells are located in the north-western portion of the Management Area and could provide an early indication of a potential migration of PFAS concentrations towards the Indian Ocean.

3 Sampling and Analytical Methodology

3.1 Sampling Dates

A summary of the monitoring dates for each event of the November 2022 – October 2023 monitoring period is presented in Table 3-1.

Table 3-1 Summary of Sampling Dates

Sampling Event	OMP activity	Sampling Period
November 2022	Groundwater monitoring (sampling and gauging)	23 – 25 November 2022
	Surface water, seepage water and sediment sampling	
First flush 2023	Surface water and sediment sampling	Not undertaken
June 2023	Groundwater monitoring (sampling and gauging)	27 June 2023
	Surface water, seepage water and sediment sampling	

3.2 Groundwater Sampling

Sampling of groundwater monitoring locations was performed in accordance with the SAQP (Cardno 2023c, Appendix B), applying methods set out in Section 6.3.3 of the SAQP. The groundwater wells monitored as part of the OMP are presented in Table 3-2 and are shown in Figure 3, Appendix A.

Table 3-2 Groundwater Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse	MW017, MW019, MW027, MW101, MW102, MW103, MW104, MW213, MW214	9
POL Storage Area (Fuel Farm)	MW004, MW008, MW105, MW119, MW210, MW212	6
Powerhouse Pathway	MW113, MW114, MW115, MW116, MW117, MW217, MW218	7
POL Storage Area (Fuel Farm) Pathway	MW107, MW109, MW110, MW111, MW112, MW202	6
Broader Area	MW129, MW130, MW134	3

3.3 Seepage Water Sampling

Seepage water monitoring and sampling was performed in accordance with the SAQP (Cardno 2021c, Appendix B), applying methods set out in Section 6.3.3 of the SAQP. The seepage water monitoring locations monitored as part of the OMP are listed in Table 3-3 and are shown in Figure 3, Appendix A.

Table 3-3 Seepage Water Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse Pathway	OTH105, OTH106, OTH107, OTH108	4
POL Storage Area (Fuel Farm) Pathway	OTH101, OTH103, OTH104	3
Broader Area	OTH102, OTH109, OTH110, OTH113	4
Point Murat Pier saltwater discharge water	OTH002	1

3.4 Surface Water Sampling

Sampling of surface water monitoring locations was performed in accordance with the SAQP (Cardno 2023c, Appendix B) applying methods set out in Section 6.4.3 of the SAQP. The surface water locations monitored as part of the OMP are presented in Table 3-4 and are shown in Figure 3, Appendix A.

Table 3-4 Surface Water Monitoring Locations

Monitoring Area	Location ID	Number
Broader Area	SW126, SW128, SW121, SW131, SW127	5
Powerhouse	SW113	1

3.5 Sediment Sampling

Sampling of sediment monitoring locations was performed in accordance with the SAQP (Cardno 2023c, Appendix B), applying methods set out in Section 6.4.4 of the SAQP. The sediment locations monitored as part of the OMP are presented in Table 3-5 and are shown in Figure 3, Appendix A.

Table 3-5 Sediment Monitoring Locations

Monitoring Area	Location ID	Number
Broader Area	SD126, SD128, SD121, SD131, SD127	5
Powerhouse	SD113	1

3.6 Deviations from the OMP SAQP

Deviations from the SAQP for the monitoring period are summarised in Table 3-6.

Table 3-6 Summary of Deviations from the OMP SAQP

Location	Deviation	Comments
		November 2022
MW217	Not sampled	Monitoring well was found dry. No impact on OMP, adjacent (<50m) well MW218 was sampled.
OTH002		Murat Pier saltwater discharge point not flowing. No impact on the OMP.
SW113; SW120; SW126; SW127; SW128		Monitoring locations found dry. No impact on existing dataset, these locations are often dry during the dry season. SW120 removed from SAQP in June 2023.
SW112 and SD112		Access denied due to asbestos hazard. Medium impact on the OMP, no data collected. Both sediment and surface water sampled previously analysed from this location have reported detectable PFAS concentrations. Location removed from SAQP in June 2023.
		First Flush (May) 2023
All locations	Not sampled	The first flush monitoring event was not undertaken as not enough rainfall was recorded to trigger a monitoring event, as per the OMP and SAQP. Limited effect on the OMP, given that no first flush event occurred.
		June 2023
MW004	No standing water level (SWL) recorded	Well PVC casing found bent, survey data unreliable. No impact on the OMP, nearby wells were used to infer groundwater levels and flow direction.
MW217	Not Sampled	Monitoring well was found blocked (assumed by roots). No impact on OMP, adjacent (<50m) well MW218 was sampled.
MW008		Well found damaged (assumed by recent earthworks). Limited impact on the OMP, other wells are monitored in the vicinity of the POL area.
OTH002		Murat Pier saltwater discharge point not flowing. No impact on the OMP.
SW121; SW126; SW127; SW131		Monitoring locations found dry. No impact on existing dataset, these locations are often dry. Sediment samples collected and analysed for PFAS.

These minor deviations from the SAQP, are not considered to have impacted the data set obtained during the monitoring period or the interpretative assessment presented in this report.

3.7 Changes to the Monitoring Network Condition

The SAQP (Cardno, 2023b) was updated in June 2023 to make the following changes:

- MW123 (no longer accessible due to asbestos hazard) was removed from the groundwater monitoring network.
- Co-located monitoring location SD/SW112 (no longer accessible) was replaced by SD/SW131 (500 m south).
- Co-located monitoring location SD/SW120 (no longer accessible) was replaced by SD/SW121 (500 m north-east).

4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP (Cardno, 2023c, Appendix B):

- Quality Assurance (QA) documentation.
- Bias.
- Data Representativeness.
- Data Precision & Accuracy.
- Laboratory Performance.
- Data Comparability.
- Data Set Completeness.

A detailed review of the Quality Assurance/Quality Control (QA/QC) aspects was completed during the monitoring events and are included within the factual reports presented in Appendix C.

The laboratory has undertaken different Quality Control (QC) measures in all sets of sample analysis which validate the accuracy of their techniques. The laboratory is appropriately certified for environmental sample analysis. It is considered that the results are accurate and reliable for the purposes of this assessment.

The data validation process has concluded that there are no significant systematic errors in the data collection process. Therefore, the data set used as the basis for the surface water, groundwater, seepage water and sediment assessment are considered valid and complete.

5 Assessment Criteria

5.1 Groundwater, Seepage Water and Surface Water

The adopted assessment criteria for groundwater, seepage water and surface water are detailed in Table 5-1.

Table 5-1 Criteria for Groundwater, Seepage and Surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFOS+PFHxS (µg/L)	PFOA (µg/L)	
Human Health – recreational water	2[1]	10	National Health and Medical Research Council (NHMRC, 2019), HEPA (2020)
Ecological – 99% species protection	0.00023[2]	19	HEPA (2020)

1. PFOS+PFHxS.
2. PFOS only; The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR) and is somewhat impractical. However, the PFAS National Environmental Management Plan (NEMP) 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.

5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecological health or human health by PFAS in sediment. The sediment concentrations are compared to the historical range of ongoing monitoring results and new maximum concentrations, or first-time detections at each sediment sampling location are recorded.

6 Contextual and Ancillary Information

6.1 Additional Analytical Data

All data available on the ESdat database at the time of reporting for each OMP monitoring location was utilised to form the basis of the interpretations and conclusions presented in this report. This data encompasses all historical data from the groundwater, seepage water, surface water and sediment sampling locations. The historical data can be found in Tables 4-6, Appendix D. No additional PFAS data outside of the results obtained from the OMP was provided for the monitoring period.

6.2 Remediation and Infrastructure Projects

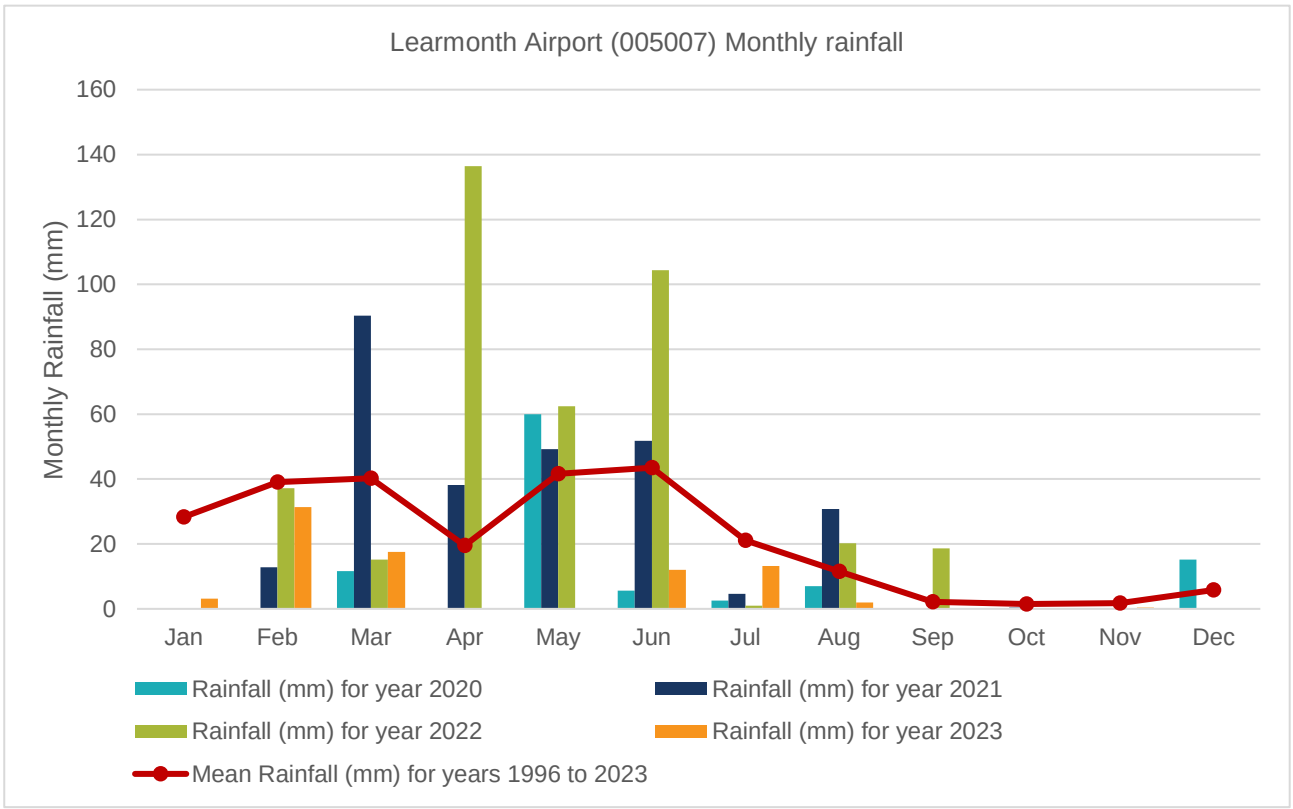
No remediation project or infrastructure works that could affect the interpretation of monitoring results were undertaken at the site during the monitoring period.

6.3 Climate

Rainfall can potentially influence the PFAS migration and groundwater elevation and flow direction. Monthly rainfall for January 2020 to December 2023 obtained from the Bureau of Meteorology (BoM) station No 005007 (Learmonth Airport) is displayed in Figure 6-1.

The monthly rainfall amounts for the monitoring period were below average. No rainfall occurred during, or in the months leading to the November 2022 monitoring event. No rainfall occurred during the June 2023 monitoring event; however, low amounts of rainfall were observed in the month of June (12 mm for the entire month) approximately 1 week before the monitoring event. No flooding was observed across the site during the monitoring events.

Figure 6-1 Monthly rainfall and long term mean monthly rainfall for Exmouth Airport (station 005007) (BoM, 2023)



7 Monitoring Data Summary

The November 2022 and June 2023 monitoring results are presented within the factual reports provided in Appendix C. Field and laboratory results are summarised in Tables 1 to 6 in Appendix D. This section presents a summary of the monitoring data for the monitoring period.

7.1 Groundwater

7.1.1 Groundwater Geochemical Parameters

Groundwater geochemical parameters [dissolved oxygen (DO), electrical conductivity (EC), total dissolved solids (TDS) and oxidation-reduction potential)ORP)] recorded in the field during the November 2022 and June 2023 monitoring events are summarised in Table 7-1 and provided in Table 2, Appendix D. An assessment of geochemical parameters has been made with reference to the following literature:

- CRC CARE. (2010). *A Technical Guide for Demonstrating Monitored Natural Attenuation of Petroleum Hydrocarbons in Groundwater*. Technical Report No. 15. Adelaide: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE).
- CRC CARE. (2018). *Guideline on Validation and Closure. Version 1.0*. CRC for Contamination Assessment and Remediation of the Environment.
- Domenico, P. S. (1997). *Physical and Chemical Hydrogeology*. Second Edition.
- NGWA. (2017). *Information Brief: Brackish Groundwater*. National Ground Water Association.

The geochemical parameters were within the historical ranges recorded for the site. Less seasonal variability was observed in the salinity parameters (EC and TDS) and DO than in previous monitoring periods, which can be attributed to the reduced groundwater recharge from rainfall events.

Table 7-1 Groundwater Geochemical Parameters

Parameter	November 2022	June 2023
DO	0.49 mg/L (MW027) – 6.43 mg/L (MW109) *Aerobic conditions*	0.69 mg/L (MW212) – 5.59 mg/L (MW117) *Aerobic conditions*
EC	1,124 µS/cm (MW214) – 54,877 µS/cm (MW114)	1,305 µS/cm (MW214) – 54,201 µS/cm (MW114)
TDS	731 mg/L (MW214) – 35,676 mg/L (MW114) *Brackish to saline conditions*	848 mg/L (MW214) – 35,230 mg/L (MW114) *Brackish to saline conditions*
pH	7.12 (MW101) – 8.2 (MW214) *Neutral to slightly alkaline conditions*	6.3 (MW027) – 8.2 (MW214) *Neutral to slightly alkaline conditions*
Eh (Field ORP+200mV)	-120.8 mV (MW104) – 306.6 mV (MW117) *Reducing to oxidising conditions.*	15.5 mV (MW101) – 229.2 mV (MW134) *Oxidising conditions*

7.1.2 Groundwater Elevations and Migration Contours

Groundwater levels and flow directions recorded during the November 2022 and June 2023 monitoring events are summarised in Table 7-2 and gauging data is provided in Table 1, Appendix D. Figures 4 and 5, Appendix A, present the inferred groundwater contours for the November 2022 and June 2023 monitoring events.

Groundwater elevations and radial flow direction for the monitoring period were consistent with historical data. However, the well gauging data is limited to the existing OMP network and was collected over several days and tide cycles, which has been considered when interpreting the inferred groundwater contours and flow direction.

The groundwater is interpreted to be radial from the site sources, with groundwater flows observed towards the inland clay pan and the coast. Much less seasonal difference was observed in the average groundwater depth across the monitoring network compared to previous monitoring periods. The groundwater elevation was marginally (0.09 mAHD) lower in the November 2022 event. This is likely a result of little to no rainfall reported during or in the month before both monitoring events.

Table 7-2 Groundwater Levels and Flow Direction

Item	November 2022	June 2023
Depths to groundwater [(metres below Top of Casing (mbTOC)]	1.71 (MW130) – 9.90 (MW134)	1.66 (MW129) – 9.68 (MW134)
Groundwater elevation (mAHD)	0.031 (MW017) – 1.039 (MW202)	-0.040 (MW019) – 2.384 (MW109)
Inferred direction of groundwater flow	Groundwater was interpreted to be radial from the site sources, with groundwater flows observed towards the inland clay pan and the coast.	
Seasonal difference in groundwater elevation	Groundwater levels were similar between the November 2022 and June 2023 monitoring events. The average groundwater elevation was 0.09 m lower during the November 2022 event.	

7.1.3 Groundwater Results Summary

The groundwater analytical data is presented in Table 4, Appendix D.

As indicated, the on-site Source Areas consist of (refer to Figure 2 of Appendix A):

- The POL Storage Area.
- The Powerhouse; and
- Point Murat Pier to a lesser extent.

7.1.3.1 POL Storage Area

A summary of the PFOS, PFOA and Sum of PFOS and PFHxS concentrations for the November 2022 and June 2023 monitoring period and the historical concentration ranges for the POL Storage Area monitoring locations are presented in Table 7-3 and plotted in Figure 7-1.

Monitoring well MW119, located the furthest downgradient, reported the highest PFAS concentrations for the area, while upgradient well MW212 reported the lowest PFAS concentrations.

The HEPA (2020) Marine Water Criteria for 99% Species Protection (Marine 99%) for PFOS were exceeded at all monitoring wells, with the exception of well MW212. The recreational criteria for PFOS+PFHxS were exceeded in one monitoring well, MW119, located downgradient of the POL Storage Area. There were no exceedances of the Marine 99% or recreational water criteria for PFOA.

There were no new guideline exceedances reported during the November 2022 and June 2023 monitoring period, and the PFAS concentrations were within the historical range for each monitoring well, with the following exceptions:

- A new maximum for PFOS was reported at well MW210 in November 2022. The concentration was within the same order of magnitude as previous results, and the following monitoring event reported PFOS within the historical range.
- A new maximum for PFOS+PFHxS was reported at MW210 in November 2022 and again in June 2023. The concentrations were within one order of magnitude of the historical maximum.
- A new maximum for PFOS+PFHxS as reported at upgradient well MW212 in November 2022; however, the concentration was within one order of magnitude as the historical maximum, and the June 2022 monitoring event reported a concentration within the historical range.
- New minimum concentrations were reported for PFOS (November 2022 and June 2023) and PFOS+PFHxS (November 2022 and June 2023) at MW004. It is noted that this monitoring well has not been sampled before November 2021, and therefore, the historical dataset is limited.

Table 7-3 POL Storage Area PFOS, PFOS+PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW004*	PFOS	0.21 – 0.35	0.18	0.06
	PFOS+PFHxS	0.24 – 0.37	0.20	0.09
	PFOA	<0.01 – 0.02	0.01	<0.01
MW008	PFOS	0.08 – 13.0	0.30	NS
	PFOS+PFHxS	0.08 – 15.0	0.33	
	PFOA	<0.01 – 0.51	<0.01	
MW105	PFOS	<0.01 – 0.68	0.07	0.06
	PFOS+PFHxS	<0.01 – 1.2	0.09	0.13
	PFOA	<0.01 – 0.29	<0.01	<0.01
MW119	PFOS	0.067 – 0.24	0.13	0.24
	PFOS+PFHxS	4.24 – 12.6	6.51	9.38
	PFOA	0.04 – 0.22	0.13	0.20
MW210	PFOS	<0.01 – 0.02	0.09	0.05
	PFOS+PFHxS	<0.01 – 0.079	0.11	0.14
	PFOA	<0.001 – 0.04	0.02	0.04
MW212	PFOS	<0.001 – 0.02	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.041	0.06	0.01
	PFOA	<0.001 – <0.01	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

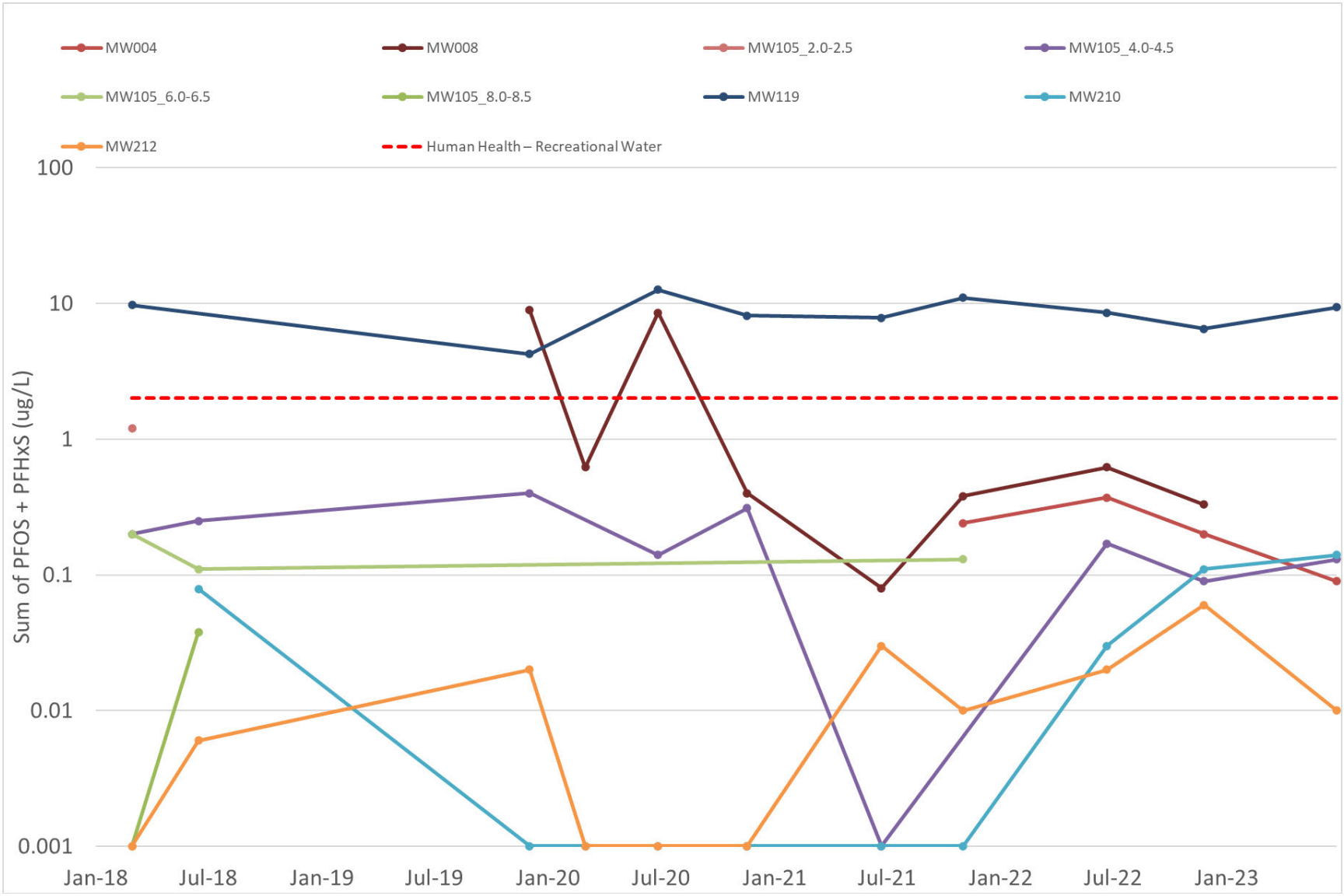
Note:

* First time sampled for PFAS in November 2021.

MW105 multilevel well. For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event.

NS = not sampled, MW008 found damaged, and was not sampled in June 2023.

Figure 7-1 POL Storage Area PFOS+PFHxS Concentrations Trends



Note: A logarithmic scale was used for the vertical axis. Values below LOR were replaced by the LOR value (0.001 µg/L) for the purpose of graphical representation. Primary samples' results plotted.

7.1.3.2 Powerhouse

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the Powerhouse monitoring locations are presented in Table 7-4 and plotted in Figure 7-2.

The PFAS concentrations were significantly greater at MW017, located to the west, than the other monitoring wells.

The Marine 99% criteria for PFOS was exceeded at all monitoring wells except wells MW104 and MW213 (located south-east of the Powerhouse building). The recreational criteria for the PFOS+PFHxS were exceeded in two monitoring wells, MW017 (to the west) and MW027, located immediately south of the Powerhouse building. PFOS+PFHxS exceedance reported at MW027 in June 2023 was a new exceedance. There were no exceedances of the Marine 99% or recreational water criteria for PFOA.

The PFAS concentrations were within the historical range for each monitoring well, with the following exceptions:

- A new maximum for PFOA was reported at MW027 in June 2023, with the concentration reported within one order of magnitude of the historical maximum.
- A new maximum (and new guideline exceedance) was reported for PFOS+PFHxS at MW027 in June 2023, with the concentration within one order of magnitude of the historical maximum.
- New minimum concentrations were reported for PFOA at MW017 in November 2022, PFOS and PFOS+PFHxS at MW027 in November 2022 and for PFOS+PFHxS at MW101 in June 2023.

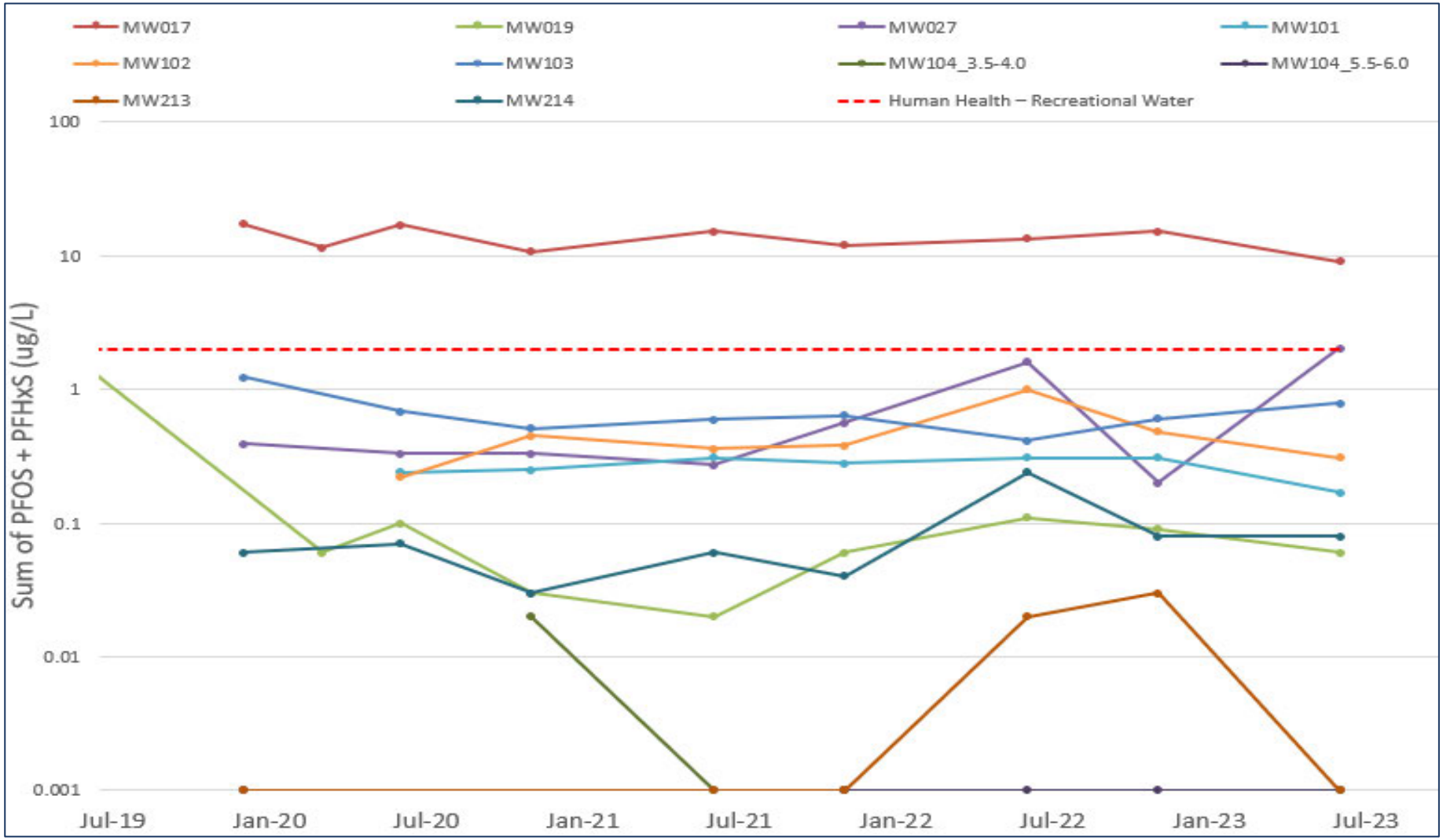
Table 7-4 Powerhouse Area PFOS, PFOS+PFHxS , and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW017	PFOS	7.8 – 15.4	12.3	13.9
	PFOS+PFHxS	10.7 – 17.8	13.4	15.1
	PFOA	0.50 – 2.10	0.48	0.68
MW019	PFOS	<0.01 – 0.03	0.02	0.01
	PFOS+PFHxS	0.02 – 0.116	0.09	0.06
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW027	PFOS	0.088 – 0.94	0.08	0.41
	PFOS+PFHxS	0.27 – 1.6	0.20	2.03
	PFOA	<0.01 – 0.06	<0.01	0.1
MW101	PFOS	<0.01 – 0.11	0.03	<0.01
	PFOS+PFHxS	0.24 – 0.537	0.31	0.17
	PFOA	0.02 – 0.11	0.04	0.02
MW102	PFOS	0.040 – 0.71	0.19	0.07
	PFOS+PFHxS	0.22 – 0.99	0.48	0.31
	PFOA	<0.01 – 0.36	0.09	0.03
MW103	PFOS	0.06 – 0.14	0.07	0.07
	PFOS+PFHxS	0.41 – 1.31	0.60	0.78
	PFOA	0.02 – 0.084	0.03	0.05
MW104	PFOS	<0.001 – 0.02	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.02	<0.01	<0.01
	PFOA	<0.001 – 0.003	<0.01	<0.01
MW213	PFOS	<0.01 – 0.027	<0.01	<0.01
	PFOS+PFHxS	<0.01 – 0.091	0.03	<0.01
	PFOA	<0.001 – 0.004	<0.01	<0.01
MW214	PFOS	0.011 – 0.22	0.06	0.08
	PFOS+PFHxS	0.028 – 0.24	0.08	0.08
	PFOA	<0.01 – 0.006	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

Notes:
MW104 multilevel well. For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

Figure 7-2 Powerhouse Area PFOS+PFHxS Concentrations Trends



Note: A logarithmic scale was used for the vertical axis. Values below LOR were replaced by the LOR value (0.001 µg/L) for the purpose of graphical representation.

7.1.3.3 POL Pathway Area

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the POL Pathway Area monitoring locations are presented in Table 7-5 and plotted in Figure 7-3.

The PFAS concentrations were reported below the LOR for all pathway locations with exception of MW107 (PFOS and PFOS+PFHxS in June 2023) and MW111 (PFOS and PFOS+PFHxS in June 2023). However, these detections were consistent with the historical concentration ranges.

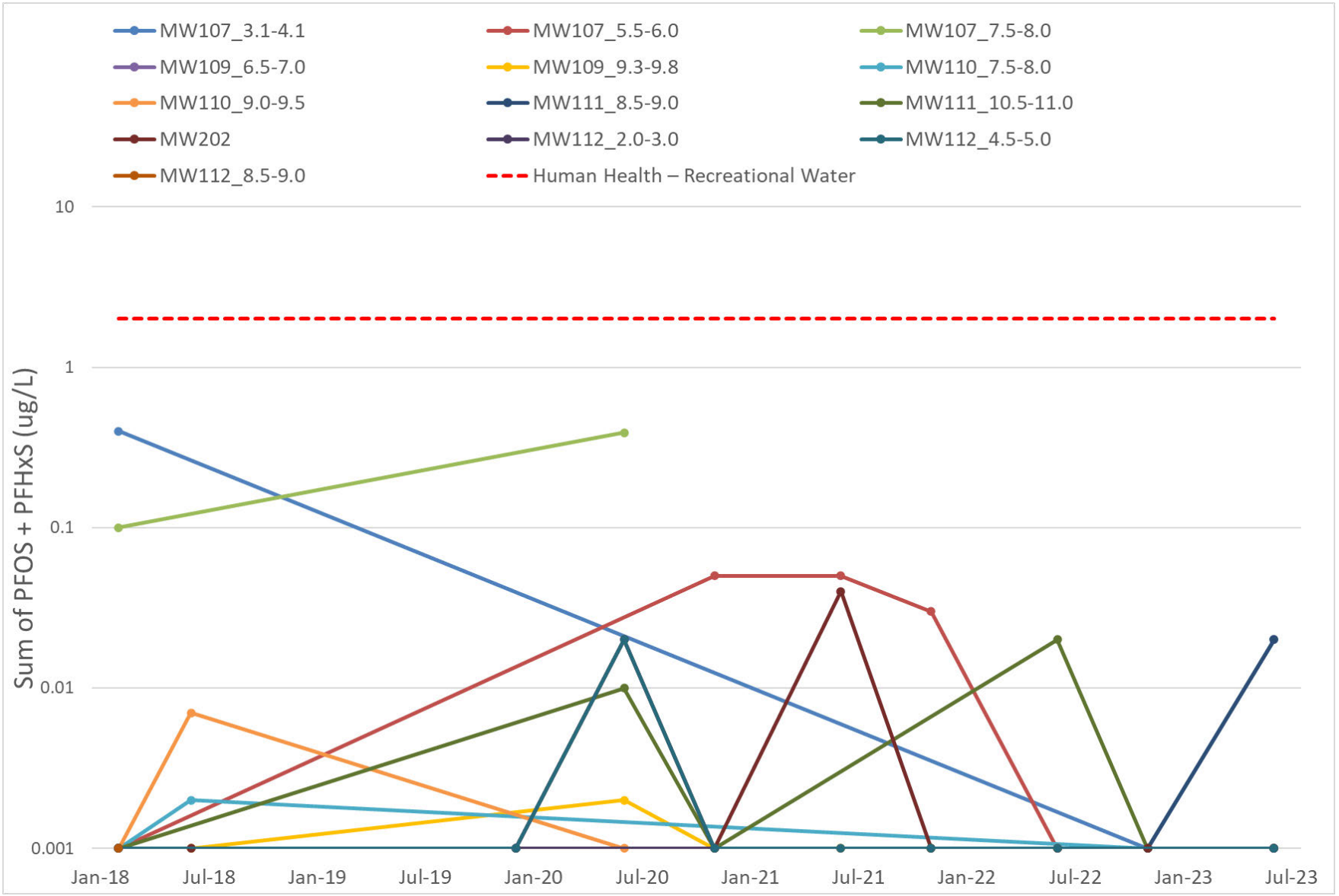
Table 7-5 POL Pathway Area PFOS+PFHxS , and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW107	PFOS	<0.01 – 0.34	<0.01	0.02
	PFOS+PFHxS	<0.01 – 0.40	<0.01	0.02
	PFOA	<0.001 – 0.008	<0.01	<0.01
MW109	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW110	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.002	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW111	PFOS	<0.001 – 0.02	<0.01	0.02
	PFOS+PFHxS	<0.001 – 0.02	<0.01	0.02
	PFOA	<0.001 – <0.01	<0.01	<0.01
MW112	PFOS	<0.001 – 0.02	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.02	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW202	PFOS	<0.001 - 0.04	<0.01	<0.01
	PFOS+PFHxS	<0.001 - 0.04	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

Notes:
MW000 multilevel well. For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

Figure 7-3 POL Pathway Area PFOS+PFHxS Concentrations Trends



Note: A logarithmic scale was used for the vertical axis. Values below LOR were replaced by the LOR value (0.001 µg/L) for the purpose of graphical representation.

7.1.3.4 Powerhouse Pathway Area

A summary of the PFOA and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the Powerhouse Pathway Area monitoring locations are presented in Table 7-6. It is noted that the results are below laboratory LOR and therefore the results have not been plotted.

Table 7-6 Powerhouse Pathway Area PFOS, PFOS+PFHxS , and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW113	PFOS	<0.001 - <0.02	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW114	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW115	PFOS	<0.001 – 0.002	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW116	PFOS	<0.001 – 0.003	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.003	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
MW117	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW217	PFOS	<0.001 – 0.004	NS	NS
	PFOS+PFHxS	<0.001 – 0.005	NS	NS
	PFOA	<0.001 – 0.001	NS	NS
MW218	PFOS	<0.001 – 0.003	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.004	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Notes
MW000 multilevel well. For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event.
NS = Not sampled. Well MW217 was blocked; replaced with MW218.

7.1.3.5 *Broader Area Wells*

A summary of the PFOA and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the Broader Area monitoring locations are presented in 0. It is noted that the results are below laboratory LOR and therefore the results have not been plotted.

Broader Area PFOS, PFOS+PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW129	PFOS	<0.01 - 0.72	<0.01	<0.01
	PFOS+PFHxS	<0.01 - 0.75	<0.01	<0.01
	PFOA	<0.01 - 0.007	<0.01	<0.01
MW130	PFOS	<0.001 - 0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - 0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW134	PFOS	<0.01 - 0.005	<0.01	<0.01
	PFOS+PFHxS	<0.01 - 0.008	<0.01	<0.01
	PFOA	<0.01 - 0.003	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note:
MW000 multilevel well. For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

7.2 Seepage Water

As part of the OMP, seepage water is sampled to assess the changes in PFAS concentrations at the receptor (Indian Ocean), downgradient of the identified source areas.

7.2.1 Seepage water geochemical parameters

Seepage water geochemical parameters recorded during the November 2022 and June 2023 monitoring events are summarised in Table 7-7 and provided Table 2, Appendix D.

Table 7-7 Seepage Water Geochemical Parameters

Parameter	November 2022	June 2023
DO	2.88 mg/L – 5.84 mg/L *Aerobic conditions.*	4.50 mg/L – 6.85 mg/L *Aerobic conditions.*
EC	53,199 µS/cm - 54,824 µS/cm	28,264 µS/cm - 55,496 µS/cm
TDS	34,585 mg/L – 35,646 mg/L *Highly saline conditions.*	18,371 mg/L – 36,072 mg/L *Saline to highly saline conditions*
pH	8.16 – 8.69 *Alkaline conditions.*	8.08 – 8.36 *Alkaline conditions.*
Eh (Field ORP + 200mV)	-74.6 mV – 286.8 mV *Reducing to oxidising conditions.*	125.4 mV – 225.5 mV *Oxidising conditions.*

7.2.2 Seepage water results summary

Seepage water is groundwater that is moving to the surface (with groundwater flow and tide effect mechanisms). Monitoring of seepage water is conducted to identify PFAS movement (if any) and potential impact from impacted groundwater beneath the source areas, to downgradient receptors. Here, receptors include sea life of the Exmouth Gulf, in particular prawns. Seepage water is sampled rather than surface water to identify the PFAS concentrations (if any) before dilution and dispersion with ocean water occurs.

Seepage water has been sampled since February 2018 with samples collected during an outgoing tide. Seepage water analytical data is presented in Table 4, Appendix D. A summary of the PFOA, PFOS, and

PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the seepage water monitoring locations are presented in Table 7-8. It is noted that the results are below laboratory LOR and therefore the results have not been plotted.

Table 7-8 Seepage Water PFOS, PFOS+PFHxS , and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
OTH002	PFOS	<0.001	NS	NS
	PFOS+PFHxS	<0.001		
	PFOA	<0.001		
OTH101	PFOS	<0.001 – 0.003	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.004	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH102	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH103	PFOS	<0.001 – 0.004	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.006	<0.01	<0.01
	PFOA	<0.001 – 0.003	<0.01	<0.01
OTH104	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH105	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH106	PFOS	<0.001 – 0.003	<0.01	<0.01
	PFOS+PFHxS	<0.001 – 0.005	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH107	PFOS	<0.0002 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.0002 - <0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH108	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH109	PFOS	<0.001 - <0.01	<0.01	<0.01
	PFOS+PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH110	PFOS	<0.01-0.003	<0.01	<0.01
	PFOS+PFHxS	<0.01-0.003	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH113	PFOS	<0.01-0.54	<0.01	<0.01
	PFOS+PFHxS	<0.01-0.56	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01

New Maximum	New Minimum	New Exceedance

NS = Not Sampled. OTH002 was not sampled as the saltwater discharge point was not flowing.

7.3 Surface Water

Surface water is sampled across the Broader Area and in the Powerhouse to assess the presence of PFAS across the Management Area and to assess PFAS concentrations in surface water, and to assess PFAS concentrations in surface water potentially discharging from the Powerhouse area.

7.3.1 Surface Water Geochemical Parameters

Geochemical parameters recorded in the field are provided in Table 3, Appendix D. A summary of the geochemical parameters is presented in Table 7-9 below.

Table 7-9 Surface Water Geochemical Parameters

Parameter	November 2022	June 2023
DO	All surface water monitoring locations were found to be dry	1.38 mg/L (SW128) – 7.86 mg/L (SW113) *Aerobic conditions*
EC		975 mS/cm (SW113) - 212,783 mS/cm (SW128)
TDS		634 mg/L (SW113) - 38,319 mg/L (SW128) *Fresh to saline conditions*
pH		7.85 (SW128) - 7.94 (SW113) *Neutral conditions*
Eh (Field ORP + 200mV)		203.6 mV (SW113) – 235.1 mV (SW128) *Oxidising conditions.*

7.3.2 Surface water results summary

Surface water has been sampled since February 2018. All surface water locations were dry during the November 2022 monitoring event and only two locations (SW113 and SW128) were sampled during the June 2023 monitoring event. Surface water analytical data is presented in Table 5, Appendix D.

A summary of the PFOS, PFOA and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the surface water monitoring locations are presented in Table 7-10. It is noted that a number of the sample locations were dry and therefore the results have not been plotted.

PFAS was reported below the LOR at SW128. SW113, located within the Powerhouse sump reported PFOS above the Marine 99% criteria in June 2023. PFOA and PFOS+PFHxS were reported above the LOR at SW113, but below the screening criteria. The concentrations of PFOS, PFOA and PFOS+PFHxS at SW113 and SW128 were within the historical concentration ranges.

Table 7-10 Surface Water PFOS, PFOS+PFHxS , and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW113	PFOS	0.10 – 1.1	NS**	0.68
	PFOS+PFHxS	0.13 – 2.4		1.17
	PFOA	0.04 – 0.86		0.26
SW126	PFOS	<0.01 - 0.003	NS**	NS**
	PFOS+PFHxS	<0.01 - 0.003		
	PFOA	<0.001		
SW127	PFOS	<0.01 - 0.002	NS**	NS**
	PFOS+PFHxS	<0.01 - 0.002		
	PFOA	<0.01		
SW128	PFOS	<0.01	NS**	<0.01
	PFOS+PFHxS	<0.01		<0.01
	PFOA	<0.01		<0.01

New Maximum | New Minimum | New Exceedance

** Location not sampled as location was found dry.

7.4 Sediment

Sediment has been sampled periodically since February 2018. The sediment analytical results are presented in Table 5 of Appendix D. A summary of the PFOA, PFOS, and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the sediment sampling locations are presented in Table 7-11. It is noted that the results are predominantly below laboratory LOR and therefore the results have not been plotted.

All sediment samples reported PFAS below the laboratory LOR, with exception of SD113, located in the Powerhouse sump and SD128 located to the south of the site and Management Area. Sediment location, SD113, reported PFOS, PFOA and PFOS+PFHxS above the LOR in November 2022 and June 2023 and SD128 reported PFOS and PFOS+PFHxS above the LOR in June 2023.

- A new maximum concentration for PFOA at SD113 was reported in November 2022, however, June 2023 reported a decrease in concentration to the LOR value.
- A first-time detection for PFOS and PFOS+PFHxS was reported at SD128 in June 2023. The concentrations were within one order of magnitude of the LOR.

Table 7-11 Sediment PFOS, PFOS+PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	Jun 2023 (mg/kg)
SD113	PFOS	0.0005 - 0.0082	0.0053	0.0038
	PFOS+PFHxS	0.0011 - 0.0093	0.0067	0.0041
	PFOA	<0.0002 - 0.0003	0.0019	0.0002
SD126	PFOS	<0.0002 – 0.0003	<0.0002	<0.0002
	PFOS+PFHxS	<0.0002 – 0.0003	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002
SD127	PFOS	<0.0002 – 0.0001	<0.0002	<0.0002
	PFOS+PFHxS	<0.0002 – 0.0001	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002
SD128	PFOS	<0.0002	<0.0002	0.0003
	PFOS+PFHxS	<0.0002	<0.0002	0.0003
	PFOA	<0.0002	<0.0002	<0.0002
SD131	PFOS	-	NS**	<0.0002
	PFOS+PFHxS	-		<0.0002
	PFOA	-		<0.0002
SD121	PFOS	-	NS**	<0.0002
	PFOS+PFHxS	-		<0.0002
	PFOA	-		<0.0002

New Maximum | New Minimum

** Location not sampled as location was found dry.

8 Interpretive Analysis

This section provides a high-level interpretation of the nature and extent of PFAS at the site based on the assessment of the data collected to date, supported by statistical analysis to evaluate whether changes have occurred to the understanding of the risk posed by PFAS in the Management Area.

8.1 Groundwater

All monitoring wells were gauged, where possible, during both biannual monitoring events. Groundwater flow direction was consistent between the two biannual monitoring events near the POL Storage Area, indicating a radial flow from the site sources. Groundwater flows were generally observed towards the inland clay pan and towards the marine environment in monitoring wells located along the coast (see Figures 4 and 5). The groundwater flows appear to be consistent with the findings of the DSI (GHD, 2018) and previous years of OMP monitoring.

It is noted that the groundwater flow interpretation is limited to the spatial extent of the existing OMP monitoring network. The OMP includes a subset of the monitoring well network used to model groundwater flow during the DSI. The groundwater wells were gauged over multiple days and tide cycles, which limits the conclusions that can be drawn concerning tidal influence on groundwater. However, the interpreted groundwater flow direction remains consistent with previous gauging events and the DSI findings.

The average groundwater elevation was marginally (0.09 mAHD) deeper in the November 2022 event than in June 2023. The seasonal difference observed in the average groundwater depth across the monitoring network was less pronounced than in previous monitoring periods. This is likely a result of little to no rainfall reported during or in the month leading up to either monitoring events.

31 monitoring wells were sampled for PFAS within the monitoring period over two monitoring events. The groundwater PFAS findings are discussed in the following sub-sections, and results are displayed in the following figures in Appendix A:

- Figures 6A and 6B for PFOS+PFHxS in the November 2022 event.
- Figures 7A and 7B for PFOS+PFHxS in the June 2023 event.
- Figures 8A and 8B for PFOA in the November 2022 event; and
- Figures 9A and 9B for PFOA in the June 2023 event.

Trends in groundwater concentrations over time have been assessed using the Mann-Kendall trend analysis to assess the PFAS stability. A minimum of four results per monitoring location are required to calculate a potential trend (i.e., increasing, stable or decreasing). The Mann-Kendall trend analysis relies on several statistical metrics, including:

- The Mann Kendall **'S' Statistic** indicates whether the concentration trend versus time is generally decreasing (S<0) or increasing (S>0). Where the value is zero, there is no overall trend.
- The **Confidence Factor (CF)** value indicates the degree of confidence in the trend result as in "Decreasing" vs. "Possibly Decreasing" or "Increasing" vs. "Possibly Increasing". A CF between 90% and 95% indicate a "Possibly" increasing or decreasing trend, when CF>95% the data demonstrate a strong trend, either "Increasing" or "Decreasing".
- The **Coefficient of Variation (CoV)** is used to distinguish between a 'No Trend' result and a 'Stable' result for a dataset with no significant increasing or decreasing trend.

For practicality, GSI (2012) outlines that a "No trend" result can be considered as evidence that concentrations are neither increasing nor decreasing at the relevant sampling location, similar to a "Stable" trend result.

Mann-Kendall trend analysis results are presented in Appendix D and summarised in the following sections.

The outcomes of the Mann-Kendall trend analysis are to be read in conjunction with the associated confidence factors and the spatial location of the monitoring wells to assess PFAS stability. The overall

PFAS stability condition can be characterised by looking at concentration trends at individual locations and PFAS length vs time (GSI, 2012)[6].

8.1.1 On-site source areas

Overall, the PFAS concentrations for the on-site source areas were consistent between the biannual monitoring events and historical ranges, indicating limited seasonal effects on the PFAS concentrations in source area groundwater. New maximum PFOS and PFOS+PFHxS concentrations were reported at monitoring wells MW210 and MW212, nearby the POL Storage Area, and a new exceedance of the recreational use criteria for PFOS+PFHxS was reported at MW027 (immediately south of the Powerhouse). However, these concentrations were within one order of magnitude as the historical maximums.

Groundwater concentration trends (Mann-Kendall trend analysis) with associated confidence factors for PFOA, PFOS and the PFOS+PFHxS across the on-site source areas are summarised in Table 8-1 and notable trends are discussed below.

Despite some new maximum and minimum PFAS concentrations reported during the monitoring period, most monitoring wells showed overall stable PFOS, PFOA and PFOS+PFHxS concentration trends. Statistically significant trends were reported for the following:

- A decreasing trend for PFOA and PFOS+PFHxS were reported at MW008 within the POL Storage Area.
- A possibly decreasing trend for PFOA and decreasing trends for PFOS and the PFOS+PFHxS were reported at MW105 within the POL Storage Area.
- An increasing trend was reported for PFOS at MW119, downgradient of the POL Storage Area.
- A possibly increasing trend for PFOA at MW210, at the POL Storage Area.
- A decreasing trend for PFOA at MW017, at the Powerhouse area.
- A possibly decreasing trend for the PFOS+PFHxS at MW104 within the Powerhouse area.

The trend analysis found that the majority of on-site source area monitoring wells display stable or decreasing PFAS concentration trends (with the exception of PFOS at MW119, downgradient of the POL Storage Area and PFOA at MW210, upgradient of the POL Storage Area).

Given there are consistent exceedances of the adopted human health and ecological assessment criteria, it is interpreted that the on-site source areas continue to act as sources of PFAS, likely via leaching from soil to groundwater. The lower than average rainfall observed during the monitoring period doesn't appear to have influenced PFAS dilution and migration as results and trends were consistent with previous years of monitoring. The understanding of the PFAS extent at source areas and associated exposure pathways remains unchanged.

[6] Mann-Kendall trend analysis toolkit.

Table 8-1 Mann-Kendall Trend Analysis Summary – On-site Source Areas

Source Area	Location ID	PFOA Trend	Confidence Factor (%)	PFOS Trend	Confidence Factor (%)	PFOS+PFHxS Trend	Confidence Factor (%)
POL Storage Area	MW008	**Decreasing**	98	No Trend	95	**Decreasing**	98
	MW004	No Trend	<1	Stable	69	Stable	69
	MW105	**Possibly Decreasing**	93	**Decreasing**	95	**Decreasing**	96
	MW119	No Trend	68	**Increasing**	98	Stable	28
	MW210	**Possibly Increasing**	99	No Trend	65	No Trend	73
	MW212	NA(1)	NA(1)	NA(1)	NA(1)	No Trend	85
Powerhouse	MW017	**Decreasing**	99	No Trend	35	Stable	63
	MW019	NA(1)	NA(1)	No Trend	15	Stable	59
	MW027	No Trend	<1	No Trend	63	No Trend	35
	MW101	Stable	84	No Trend	27	Stable	61
	MW102	Stable	33	No Trend	71	Stable	40
	MW103	Stable	83	Stable	76	Stable	89
	MW104	Stable	84	Stable	85	**Possibly Decreasing**	95
	MW213	Stable	62	No Trend	89	No Trend	49
	MW214	Stable	88	No Trend	63	No Trend	72

Note:

(1) Trend Not Analysed – no detection above the laboratory LOR. Can be considered “stable” for the purpose of trend analysis.

8.1.2 Pathway Areas

A trend analysis was not conducted for the Pathway Area monitoring wells since most results were below the laboratory LOR.

It is noted that little rainfall was observed over the monitoring period, and the Pathway Area monitoring wells reported concentrations below the LOR for both monitoring events, except MW107 and MW111. These two monitoring wells reported PFOS and PFOS+PFHxS concentrations above the LOR in June 2023. The detected concentrations were reported within the historical range.

The average and median PFAS concentrations for the monitoring wells within these areas remain within the same order of magnitude as the historical concentrations. None of the management response triggers presented in the OMP were exceeded during the reporting period. The groundwater monitoring results for this monitoring period have not indicated any changes in the understanding of PFAS extent or the risk profile for the Management Area.

8.1.3 Broader Area

The Broader Area monitoring wells have been sampled since June 2018, with three wells sampled as part of the OMP.

All three monitoring wells reported PFAS concentrations below the LOR during the biannual monitoring events. Mann Kendal analysis reports stable or no trends in PFAS concentrations since the commencement of monitoring in 2018. The average and median PFAS concentrations for the monitoring wells within this area remained within the same order of magnitude as the historical concentrations.

Overall, the groundwater monitoring results do not suggest a change in the understanding of PFAS extent or risk within the Management Area.

Table 8-2 Mann-Kendall Trend Analysis Summary – Broader Area wells

Location	PFOA Trend	Confidence Factor (%)	PFOS Trend	Confidence Factor (%)	PFOS+PFHxS	Confidence Factor (%)
MW129	No Trend	82	No Trend	87	No Trend	87
MW130	NA(1)	NA(1)	No Trend	77	No Trend	77
MW134	Stable	82	Stable	82	No Trend	82

Note:

(1) Trend Not Analysed – no detection above the laboratory LOR. Can be considered “stable” for the purpose of trend analysis.

8.2 Seepage Water

All seepage water monitoring locations reported PFAS concentrations below the laboratory LOR during the monitoring period. Considering the dilution factor when reaching the Exmouth Gulf, the potential risk remains low and acceptable.

It is noted that PFAS has not been reported above the LOR at OTH113 for the past four monitoring events (November 2021, June 2022, November 2022, and June 2023), suggesting the new maximum reported for PFOS+PFHxS (0.56 µg/L) in June 2021 was an outlier and does not indicate PFAS migration.

8.3 Surface Water

Surface water is monitored within the wider environment across the Management Area and at one location within the Powerhouse source area (SW113). It is noted that, due to less than average rainfall experienced during the monitoring period and the lack of a first flush event, all surface water locations were dry and unable to be sampled except for SW113 and SW128 in June 2023.

Except for SW113, which has consistently reported PFAS above the laboratory LOR, surface water results for SW128 were reported below the laboratory LOR. This is consistent with historical results and suggests surface water is not the main pathway/transport mechanism for PFAS migration from the source areas.

8.4 Sediment

Sediment is monitored within the wider environment across the Management Area and at one location within the Powerhouse source area (SD113). PFOS+PFHxS results for November 2022 and June 2023 are presented in Figures 10 and 11 of Appendix A, respectively.

Sediment results were below the laboratory LOR for all locations with exception of SD113, which consistently reports PFAS above the LOR, and at SD128, located to the south of the site and Management Area, which reported first-time detections of PFOS and PFOS+PFHxS in June 2023.

The reported PFOS concentration at SD128 is only marginally greater than the LOR (concentration of 0.0003 mg/kg compared to an LOR of 0.0002 mg/kg). It is considered that the first-time detection at SD128 is a potential outlier due to the following lines of evidence:

- SD128 is located a significant distance from the source areas,
- Sediment samples located between the source areas and SD128 (SD126, SD131 and SD127) did not report PFAS above the LOR,
- The co-located surface water sample, SW128, did not report PFAS above the laboratory LOR.

With exception of SD128, the sediment PFAS results are consistent with the co-located surface water results and suggests sediment is not the main pathway/transport mechanism for PFAS migration from the source areas.

9 Conceptual Site Model

The evaluation of analytical results within this report does not suggest that the nature and extent of PFAS in groundwater, surface water, seepage water, and sediment have significantly changed compared to that inferred from previous investigations and monitoring data.

The understanding of on-site sources and on-site pathway areas presented in the Detailed Site Investigation (GHD, 2018) is supported by the OMP monitoring data presented in this OMR (and previous interpretative reports). The predominant stability in PFAS trends in groundwater at the source area monitoring wells and boundary/Broader Area wells also suggests PFAS concentrations at these locations do not appear to be changing significantly.

The pathways for PFAS exposure and risks to human health and ecological receptors identified during the previous DSI (GHD, 2018) are considered to remain relevant and the monitoring data presented in this report does not suggest any significant changes to these mechanisms or risks. PFAS remains present in groundwater beneath the on-site source areas and has the potential to be mobilised with groundwater flow.

The data presented in this OMR does not significantly change the understanding of the CSM presented in the DSI (GHD, 2018). Future monitoring will continue to contribute to an evaluation of any potential changes to the CSM and risk understanding.

10 Discussion

10.1 Risk Profile

The ecological risk assessment (ERA) conducted in 2019 (GHD, 2019) further assessed the risks identified in the DSI that were considered to be “elevated” and determined that:

- PFAS posed a low risk to lower trophic level terrestrial and aquatic organisms across the Management Area.
- PFAS posed a low risk with respect to the potential for bioaccumulation and biomagnification in avian food chains across the Management Area, including the terrestrial environments of the site, the ephemeral clay pan and Exmouth Gulf.
- PFAS posed a low risk with respect to the potential for bioaccumulation and biomagnification in aquatic mammals. While the PFAS concentrations estimated for fish in the nearshore environment of Exmouth Gulf using average detected beach seepage water PFAS concentrations marginally exceeded the NEMP mammalian wildlife diet guideline, the absence of PFOS in the majority (>80%) of beach seepage samples collected, the low rates of groundwater discharge into Exmouth Gulf and the resulting high levels of dilution and dispersion support the conclusion that the concentrations in fish will be much less than estimated; and
- PFAS posed a low risk to marine turtles that nest along the beaches of the Management Area. In particular, the DSI showed that PFAS is largely absent in the unsaturated surface soils of the sandy dune areas, where marine turtle eggs were buried.

It was concluded that the information gathered during the ERA supported the conclusion made in the DSI, that PFAS exposure risks to recreational anglers were low and acceptable across the Management Area. Site-derived PFAS was also found to be unlikely to harm prawn stocks within Exmouth Gulf or to bioaccumulate to potentially harmful levels within the commercial prawn catch of the Exmouth Gulf Managed Prawn Fishery (EGMPF).

10.2 Management Response Triggers

The OMP outlines management response triggers to assess whether a more active response is required to manage changes in PFAS. The triggers include:

- Receptor Triggers for groundwater and seepage water:
  - PFAS is detected in groundwater wells or seepage locations that were previously not detected.
  - Average and/or median PFAS in a monitoring zone has increased by one or more orders of magnitude with a corresponding increase in the data variance.

The data obtained during the monitoring period has been reviewed against the management response triggers presented in the OMP. No triggers were exceeded during the monitoring period.

This risk profile remains low and acceptable based on the currently available data. Potential changes in groundwater, seepage water, surface water, and sediment PFAS concentrations will continue to be evaluated through future monitoring and reporting.

10.3 Triggers for OMP Review

The OMP is reviewed annually, considering existing available trend data to tailor the monitoring program to site-specific characteristics. A review of the OMP may be required for several reasons, including (but not limited to):

- Changes in our understanding of the risks that may inform an early warning that additional management of PFAS contamination may be warranted in areas not currently affected by PFAS.
- Changes to State/Territory advice on types of exposure-minimisation behaviours (e.g., consumption of home produce or seafood).
- Changes to State/Territory advice on boundaries of a designated management area and the management zones within.
- Changes or refinements to the monitoring network, frequency, and parameters.

- Feedback and information received as part of community consultation.
- Significant changes of land use within the Management Area or at close proximity.
- Changes to Defence's strategic approach to managing PFAS contamination.
- Changes detected through the implementation of the OMP may inform a number of risk-management decisions including:
  - Additional investigations,
  - Re-assessment of the risk profile,
  - Implementation of remediation or containment actions,
  - Changing risk management actions at receptor level.

The November 2022 – October 2023 monitoring results did not identify a change in the risk profile for the Management Area or further management actions that would trigger the need for an OMP review.

11 Conclusions

Groundwater, seepage water, surface water and sediment monitoring and sampling was conducted between November 2022 and October 2023 in accordance with the SAQP (Cardno, 2023b). Data from the DSI (GHD, 2018) and previous years of OMP implementation is also included and considered in this OMR to inform the understanding of the risk.

Overall, the concentrations of PFAS across the media and locations sampled are consistent and of the same order of magnitude as historical data. Mann Kendall trend analysis outcomes predominantly indicated that there were potentially stable trends or no statistically significant trends. Groundwater monitoring wells at the source areas displayed either a decreasing, stable or the absence of a trend depending on the compound under review. An exception is noted at MW119, located downgradient (towards the clay pan) of the POL Storage Area, which displayed an increasing trend for PFOS, and MW210, located upgradient of the POL Storage Area, which displayed a possibly increasing trend for PFOA.

The pathway and receptor monitoring locations reported PFAS concentrations below the LOR, with exception of minor PFOS+PFHxS detections in POL Storage Area Pathway Area monitoring wells MW107 and MW111 in June 2023, consistent with historically reported concentrations. The concentrations of PFAS become undetectable (i.e. below the laboratory LOR) before reaching the marine environment.

The nature and extent of PFAS across all media has not changed from the understanding presented in the investigation phases, previous interpretative reports, and the PMAP. Based on the current available data, there is no significant change to the risk profile of the Management Area nor the understanding of the CSM.

The November 2022 – October 2023 monitoring results did not identify a change in the risk profile for the Management Area that would trigger the need for an OMP review or further management actions.

Given the persistent PFAS concentrations at the on-site source areas (POL Storage Area and Powerhouse); it is likely that these continue to act as sources. The ongoing monitoring program should be continued to provide additional temporal data and PFAS extent/behaviour information to further evaluate risk findings.

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APPENDIX

A

FIGURES

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Site
Lake McLeod
Ningaloo Marine Park
Harold E Holt Area A
North-West Cape
Bundegi Beach
Cape Range National Park
Exmouth
Exmouth Gulf
Legend
Management Area / Commonwealth boundary
HEHA Site Features
FIGURE 1
1:80,000 Scale at A3
Metres
0
1,500
3,000
Site Location
2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2024-02-27 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

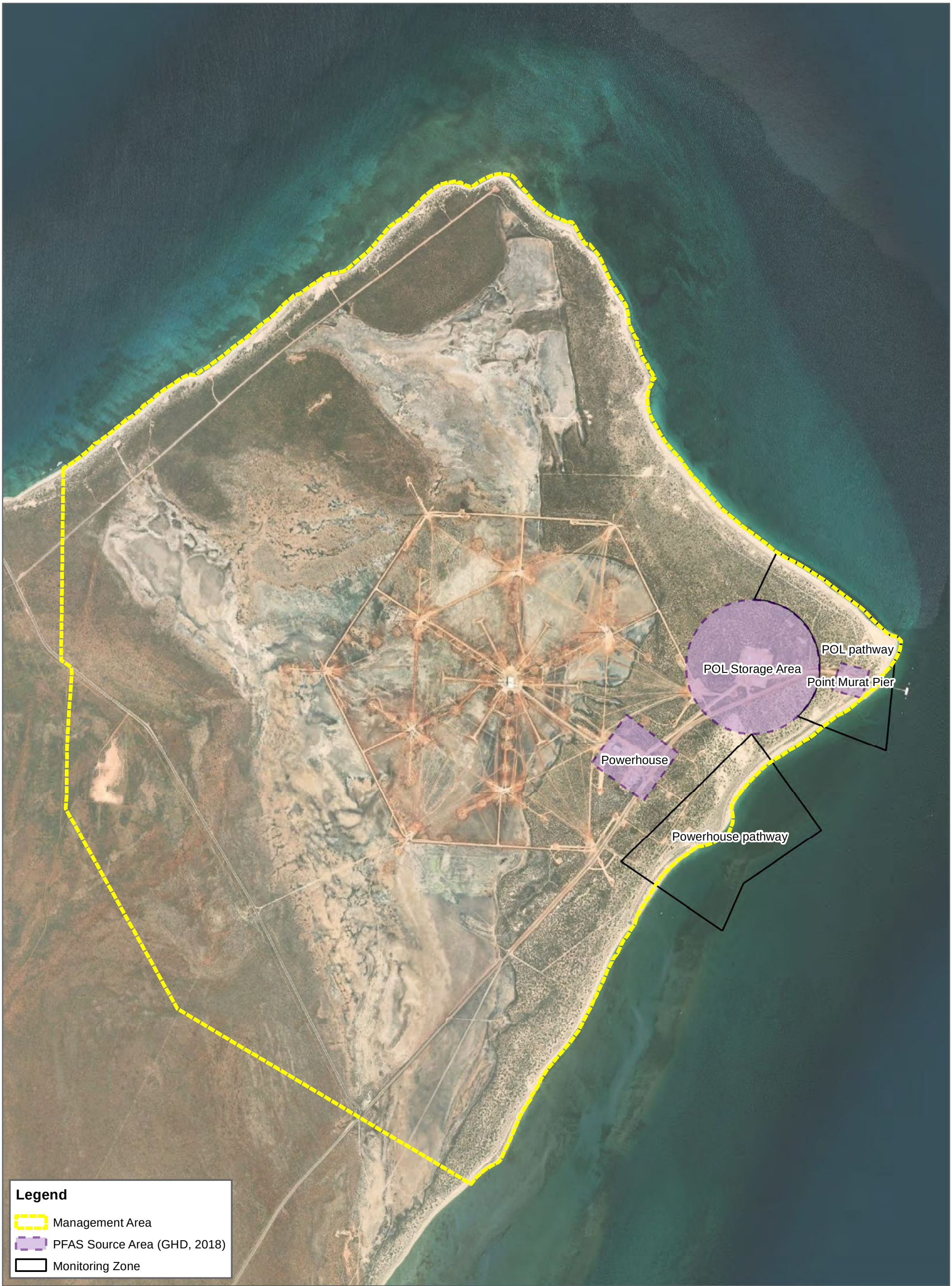

FIGURE 2

1:25,000 Scale at A3

Metres

0 500 1,000

Management Area

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2024-03-05 | Project: DEF19009
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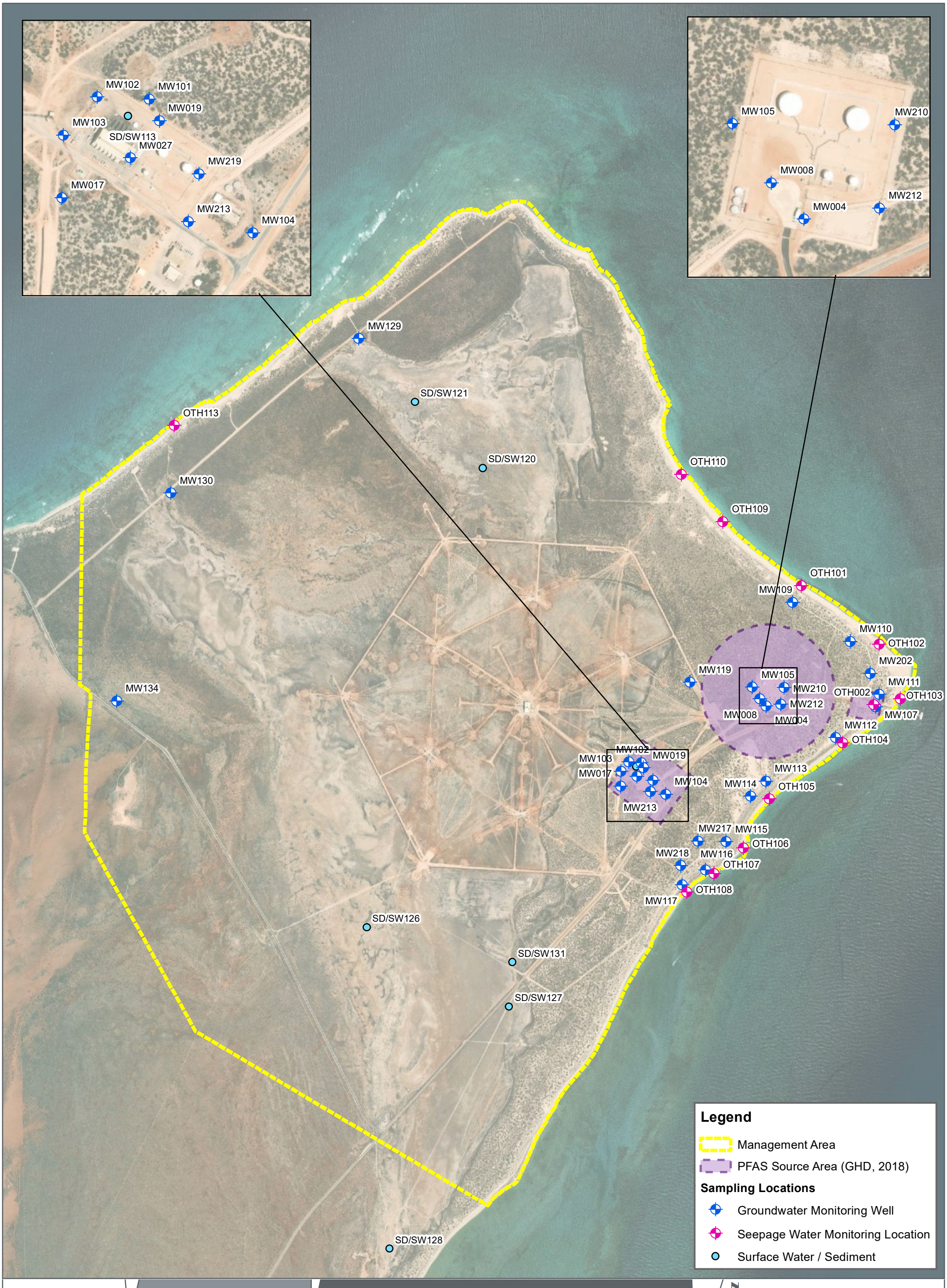
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MW101
MW019
MW103
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MW213
MW104
MW105
MW210
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SD/SW121
OTH113
SD/SW120
OTH110
MW130
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
MW111
OTH002
OTH103
MW107
MW112
OTH104
MW134
MW102
MW019
MW103
MW017
MW104
MW213
MW113
MW114
OTH105
MW217
MW115
OTH106
MW218
MW116
OTH107
OTH108
MW117
SD/SW126
SD/SW131
SD/SW127
SD/SW128
Legend
Management Area
PFAS Source Area (GHD, 2018)
Sampling Locations
Groundwater Monitoring Well
Seepage Water Monitoring Location
Surface Water / Sediment
FIGURE 3
1:25,000 Scale at A3
Metres
0
500
1,000
Monitoring Locations
2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2024-07-11 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_MonitoringLocations 04.mxd

FIGURE 4

1:25,000 Scale at A3

Metres

0 500 1,000

Nov-22 Inferred Groundwater Contours

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2024-07-18 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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FIGURE 5

1:24,000 Scale at A3

Metres

0 500 1,000

Jun-23 Inferred Groundwater Contours

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2024-07-18 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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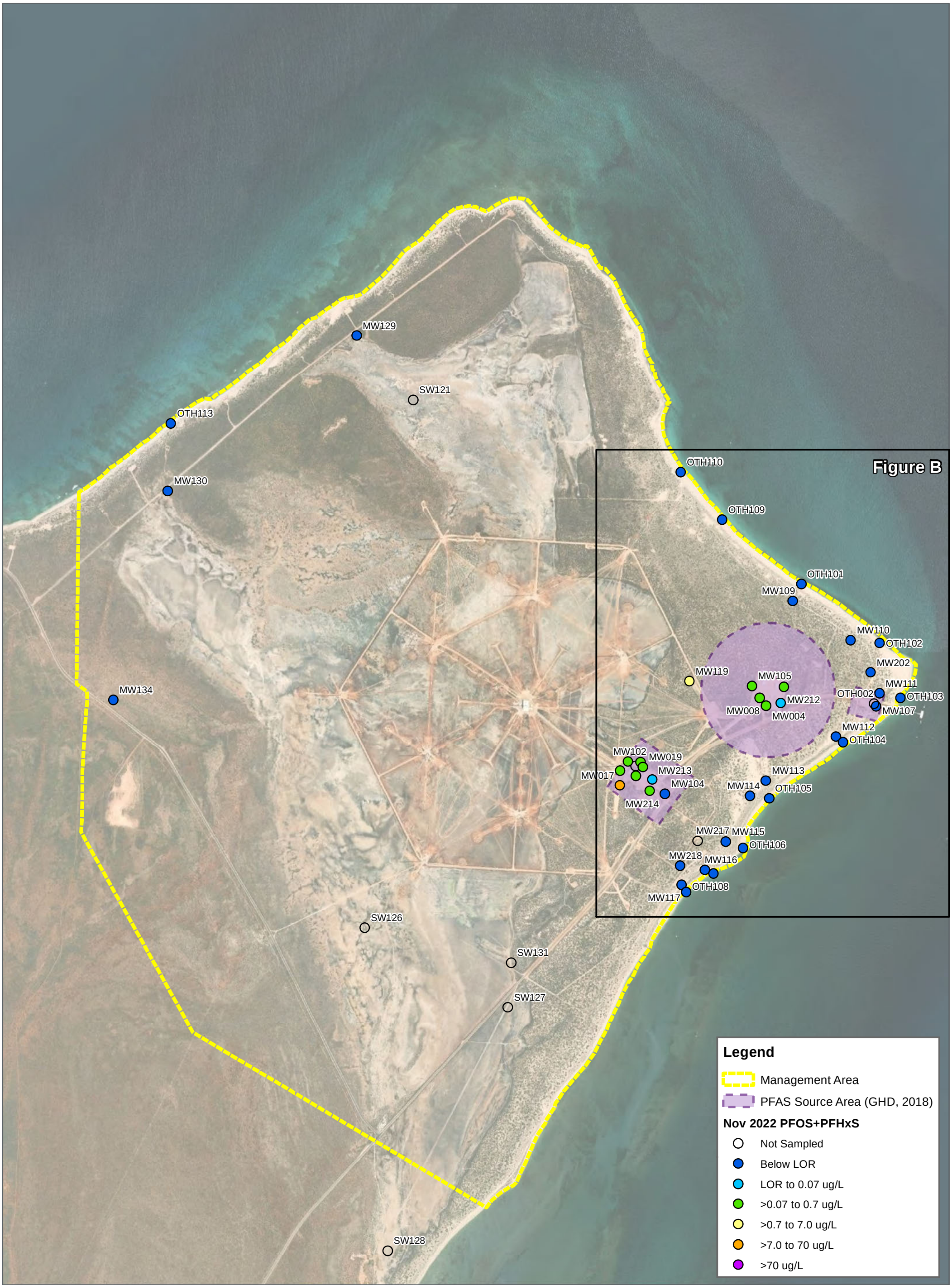

FIGURE 6A

1:25,000 Scale at A3

Metres

0 500 1,000

PFOS+PFHxS Concentrations - Nov-22

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2024-03-07 | Project: DEF19009
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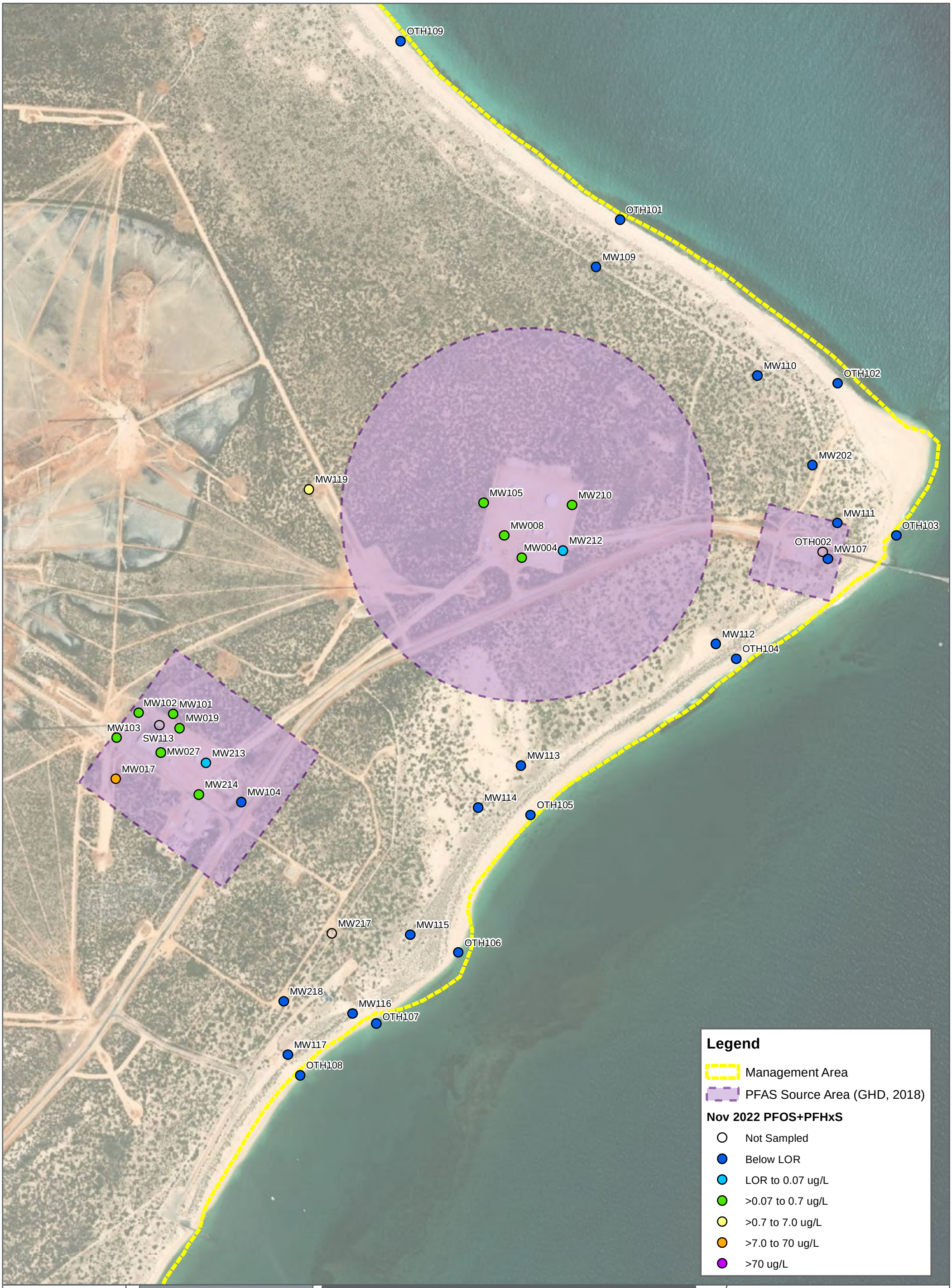
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MW212
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MW112
OTH104
MW102
MW101
MW019
MW103
SW113
MW027
MW213
MW017
MW214
MW104
MW113
MW114
OTH105
MW217
MW115
OTH106
MW218
MW116
OTH107
MW117
OTH108
Legend
Management Area
PFAS Source Area (GHD, 2018)
Nov 2022 PFOS+PFHxS
Not Sampled
Below LOR
LOR to 0.07 ug/L
>0.07 to 0.7 ug/L
>0.7 to 7.0 ug/L
>7.0 to 70 ug/L
>70 ug/L
FIGURE 6B
1:9,000 Scale at A3
Metres
0
180
360
PFOS+PFHxS Concentrations - Nov-22
2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2024-03-07 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-06B_PFOS+PFHxS_Nov22 01.mxd

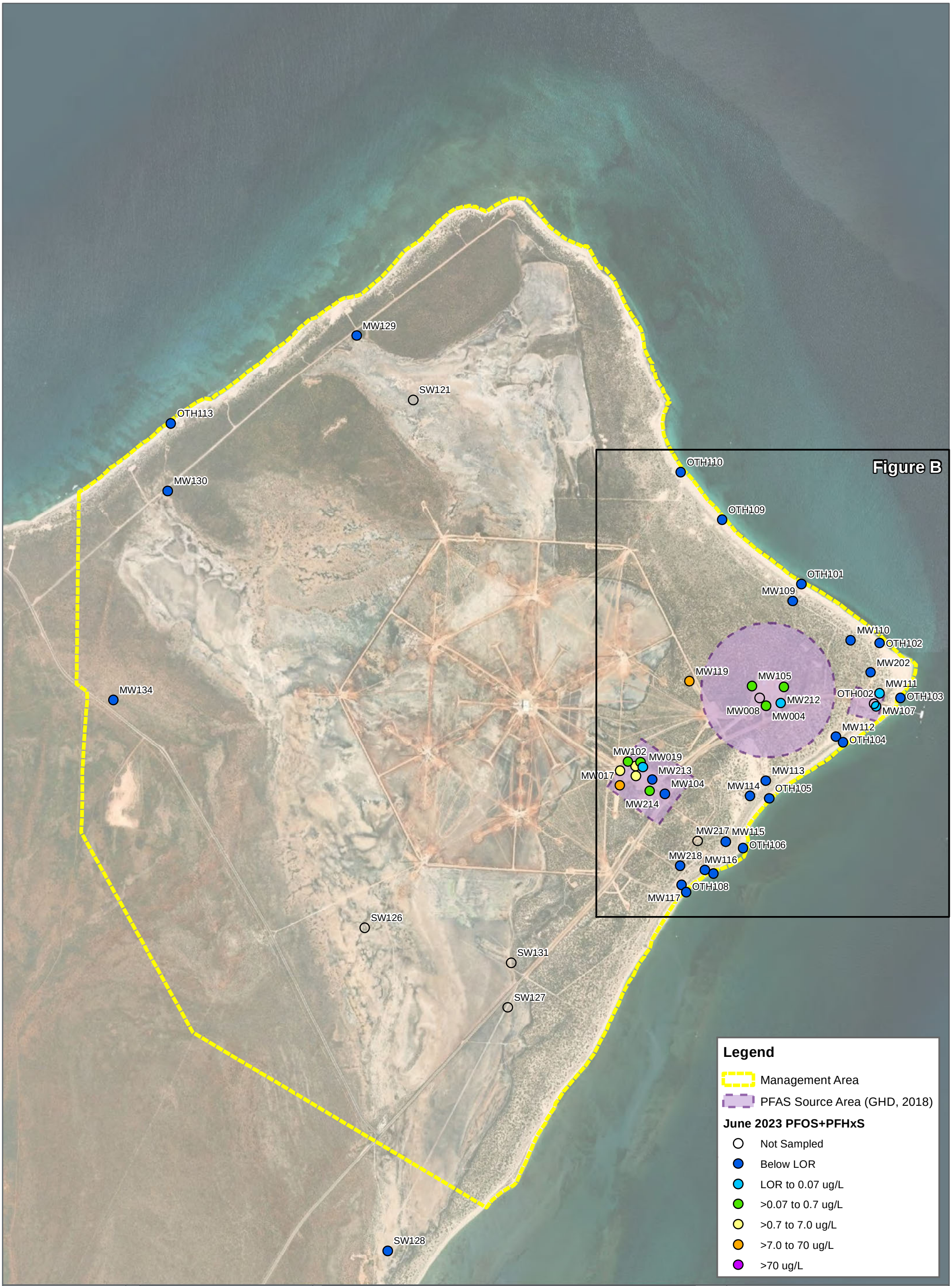


FIGURE 7A

1:25,000 Scale at A3

Metres

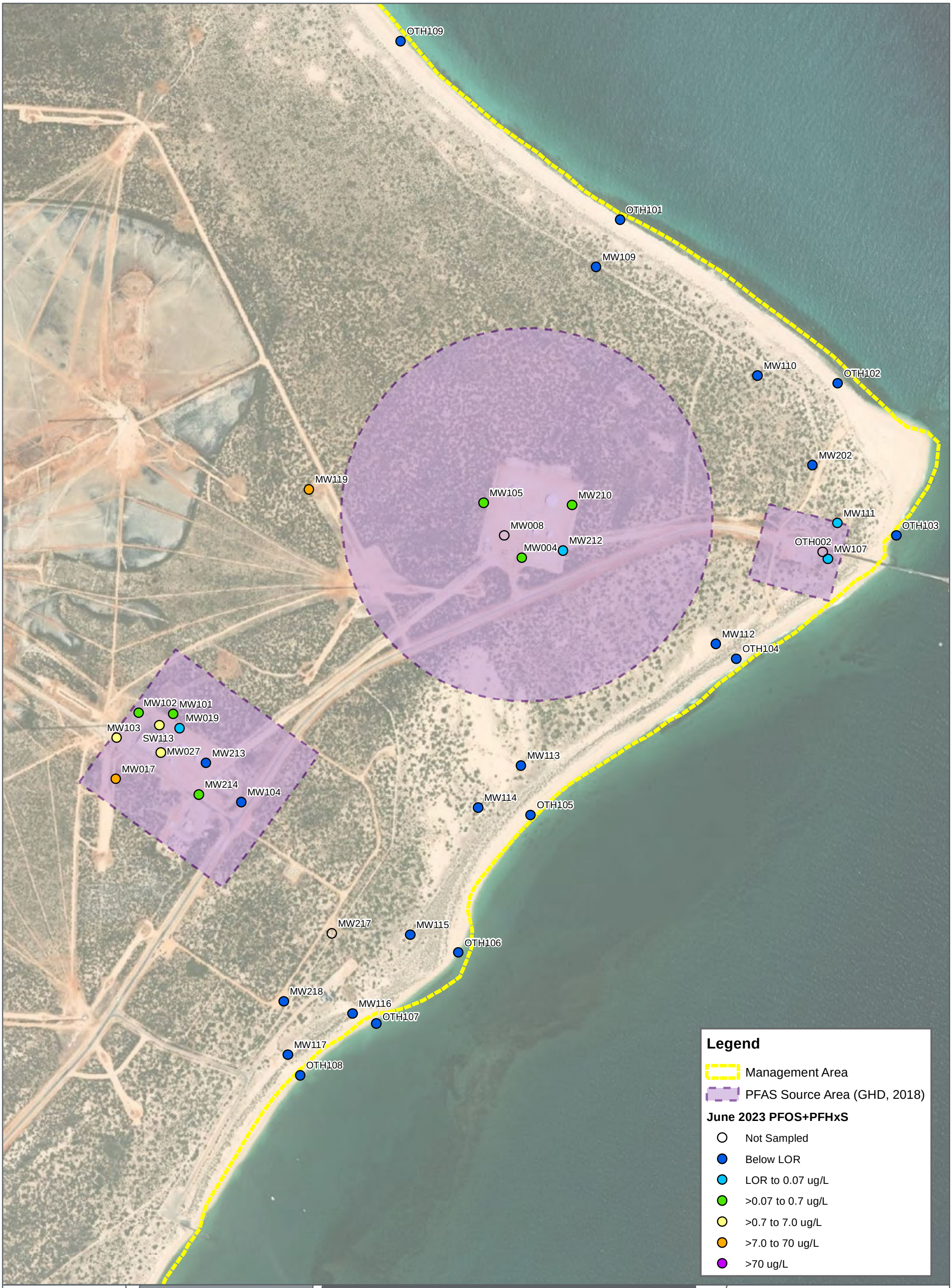
0 500 1,000

PFOS+PFHxS Concentrations - Jun-23

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2024-03-07 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-08A_PFOS+PFHxS_Jun23 01.mxd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MW017
MW214
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MW113
MW114
OTH105
MW217
MW115
OTH106
MW218
MW116
OTH107
MW117
OTH108
Legend
Management Area
PFAS Source Area (GHD, 2018)
June 2023 PFOS+PFHxS
Not Sampled
Below LOR
LOR to 0.07 ug/L
>0.07 to 0.7 ug/L
>0.7 to 7.0 ug/L
>7.0 to 70 ug/L
>70 ug/L
FIGURE 7B
1:9,000 Scale at A3
Metres
0
180
360
PFOS+PFHxS Concentrations - Jun-23
2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
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Cardno
Map Produced by Cardno WA
Date: 2024-03-07 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-08B_PFOS+PFHxS_Jun23 01.mxd

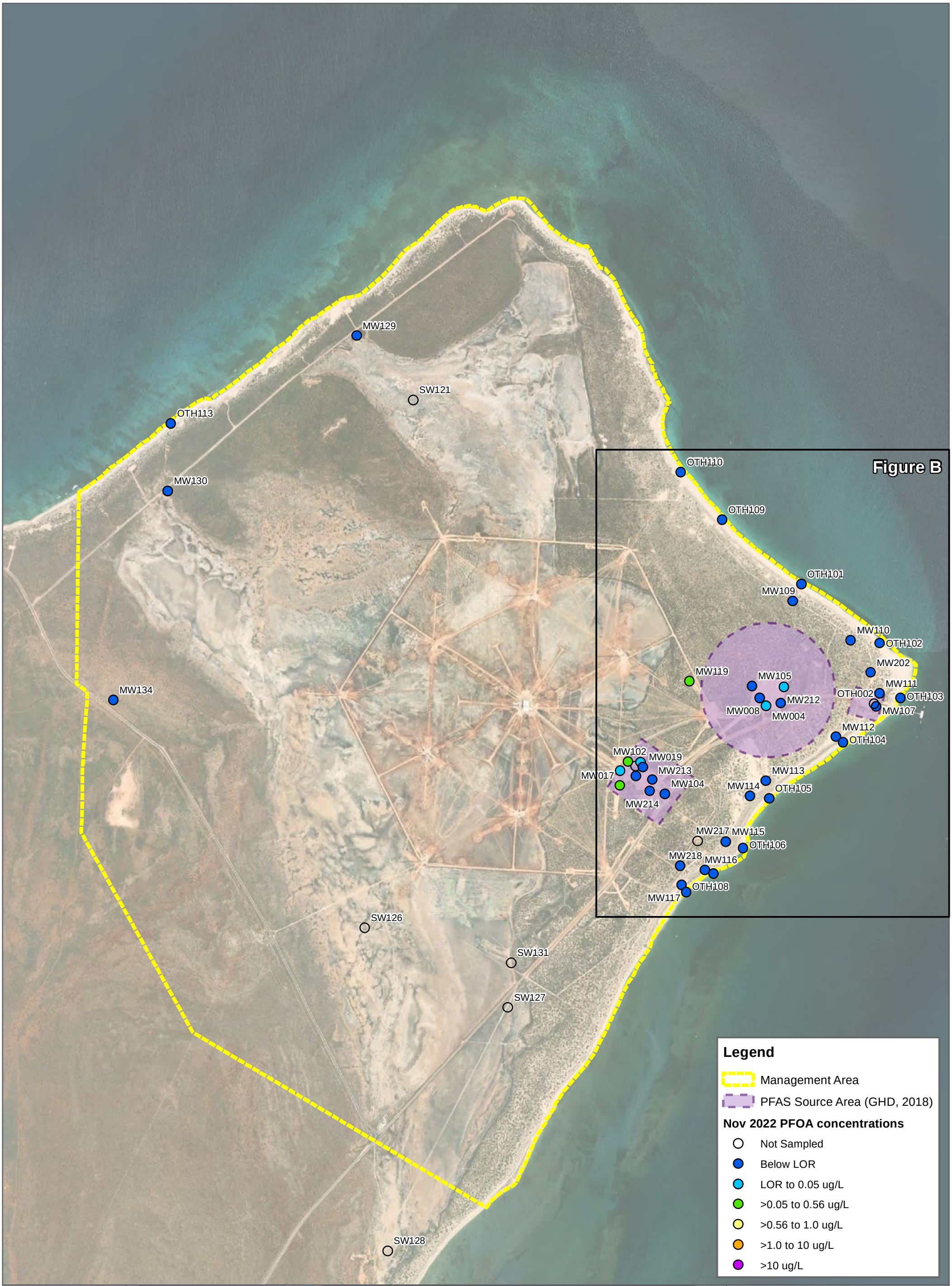

FIGURE 8A

1:25,000 Scale at A3

Metres

0 500 1,000

PFOA Concentrations - Nov-22

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
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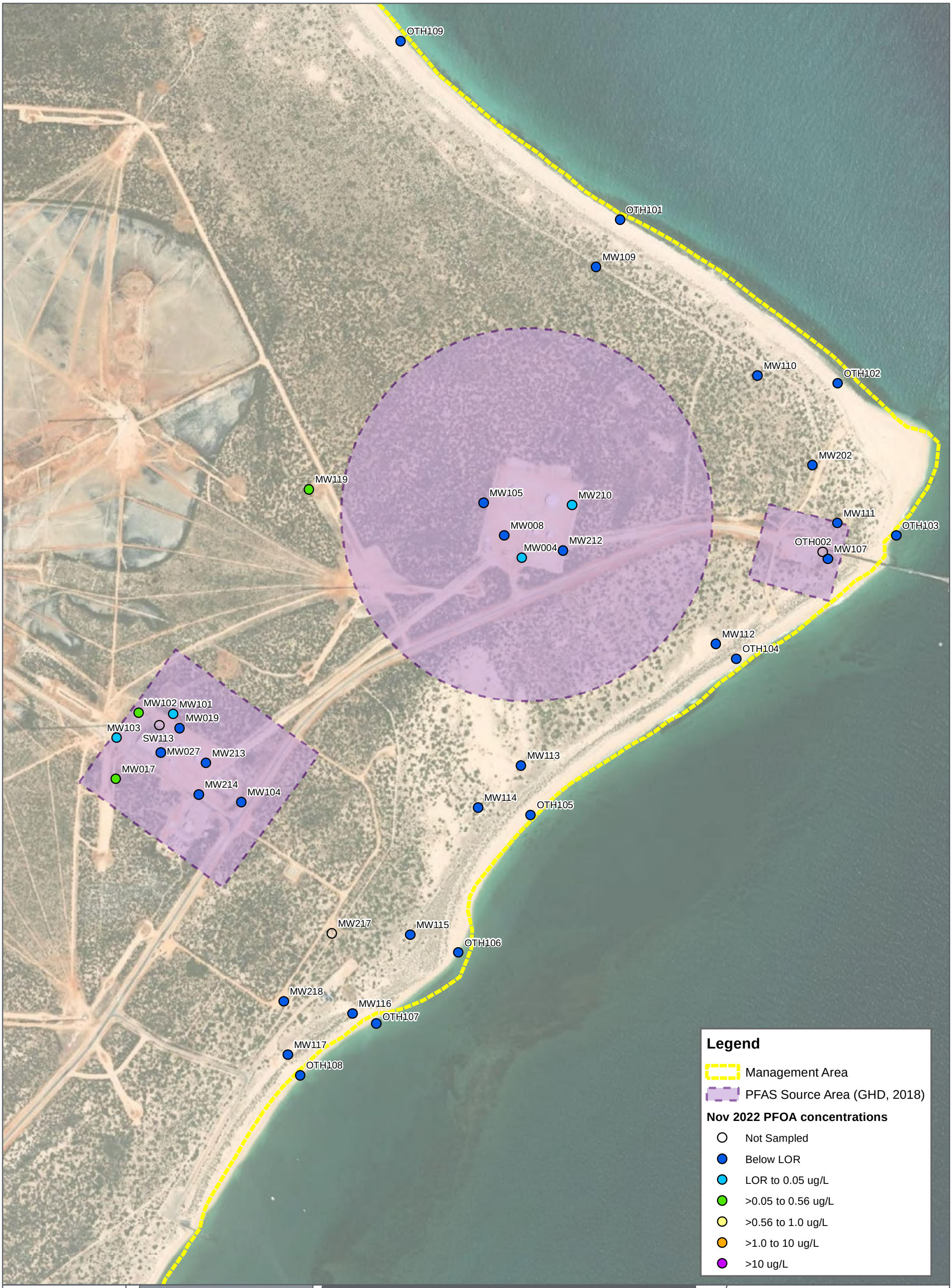
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MW213
MW017
MW214
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OTH105
MW217
MW115
OTH106
MW218
MW116
OTH107
MW117
OTH108
Legend
Management Area
PFAS Source Area (GHD, 2018)
Nov 2022 PFOA concentrations
Not Sampled
Below LOR
LOR to 0.05 ug/L
>0.05 to 0.56 ug/L
>0.56 to 1.0 ug/L
>1.0 to 10 ug/L
>10 ug/L
FIGURE 8B
1:9,000 Scale at A3
Metres
0
180
360
PFOA Concentrations - Nov-22
2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2024-03-07 | Project: DEF19009
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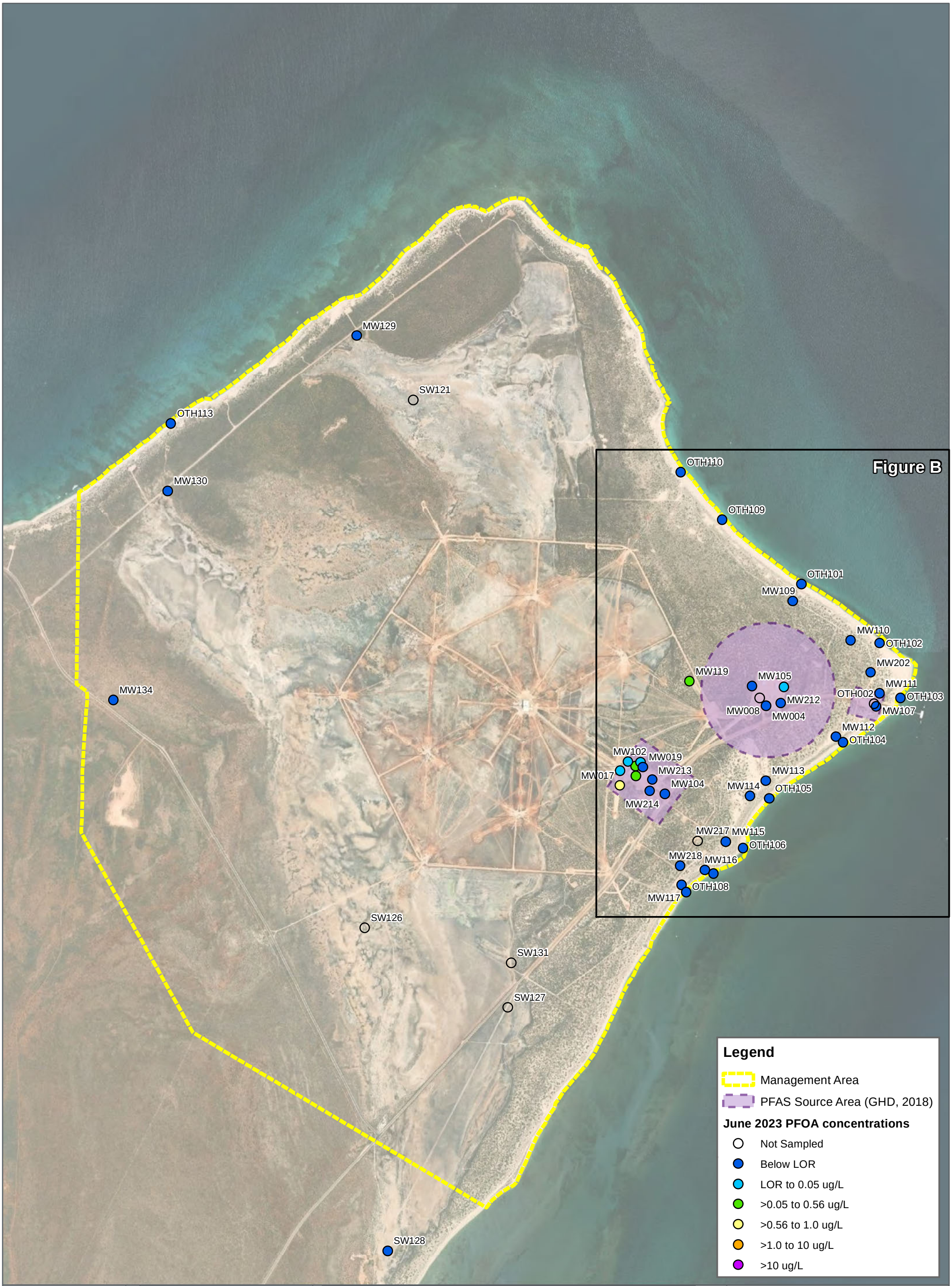

FIGURE 9A

1:25,000 Scale at A3

Metres

0 500 1,000

PFOA Concentrations - Jun-23

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

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Map Produced by Cardno WA
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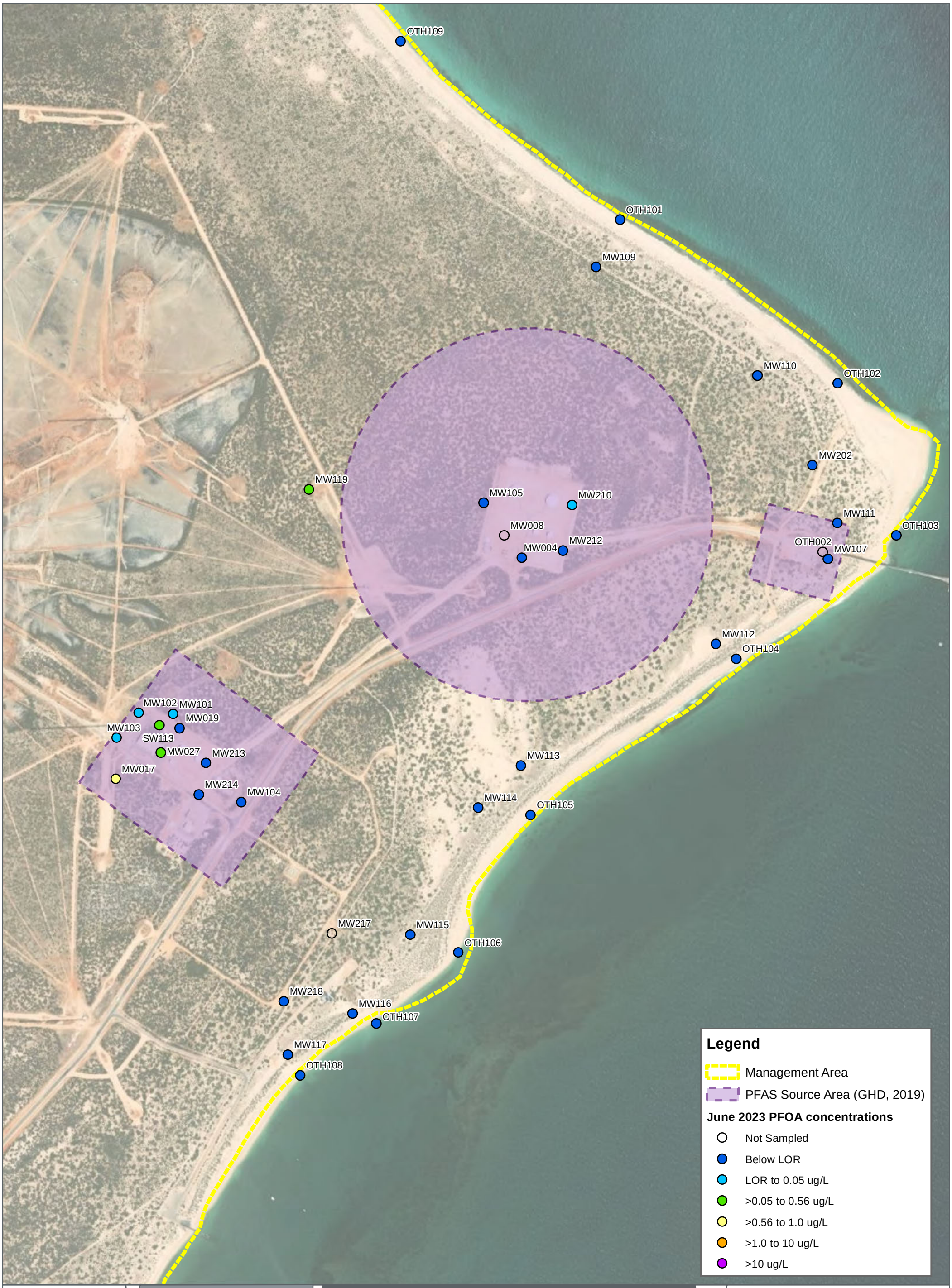
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-011A_PFOA_Jun23 01.mxd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MW116
OTH107
MW117
OTH108
Legend
Management Area
PFAS Source Area (GHD, 2019)
June 2023 PFOA concentrations
Not Sampled
Below LOR
LOR to 0.05 ug/L
>0.05 to 0.56 ug/L
>0.56 to 1.0 ug/L
>1.0 to 10 ug/L
>10 ug/L
FIGURE 9B
1:9,000 Scale at A3
Metres
0
180
360
PFOA Concentrations - Jun-23
2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2024-03-07 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-011B_PFOA_Jun23 01.mxd

FIGURE 10

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Concentrations - Nov-22

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

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Map Produced by Cardno WA
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Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-012_SD_Nov22 01.mxd

FIGURE 11

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Concentrations - Jun-23

2023 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

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Map Produced by Cardno WA
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Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-014_SD_Jun23 01.mxd

APPENDIX

B

SAQP

Cardno

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Stantec

PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP)

Naval Communication Station Harold Holt A

Prepared for

Department of Defence

1 June 2023

Cardno

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Date	1 June 2023
Version Number	Rev 7

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Appendices

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Appendix B Full PFAS Analytical Suite

1 Introduction

Cardno have been engaged by the Australian Department of Defence ('Defence' or 'Client') to prepare a Sampling and Analysis Quality Plan (SAQP) as part of the Ongoing Monitoring Plan (OMP), the purpose of which to monitor trends in the extent and concentrations of per- and poly-fluoroalkyl substances (PFAS) impacts identified on and around the Naval Communication Station Harold E Holt - Area A (HEH-A), Exmouth, Western Australia (Figure 1, Appendix A).

The OMP SAQP applies to not only HEH-A, but also the surrounding areas that, together with the Base, make up the "Management Area" (Figure 2, Appendix A). For the purposes of this report:

- "the site" was defined as Harold E Holt – Area A (Figure 1, Appendix A).
- "the Management Area" was defined as comprising the site, plus the land extending to the Exmouth Gulf (to the east, north and north-west) (Figure 2, Appendix A).

The site is located on Commonwealth Land and is regulated under Commonwealth environmental legislation. The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, seepage water, surface water and sediment originating from the site. The monitoring frequency aligns with the climate of the Management Area, which features the highest volume of rainfall typically between January and July and lower rainfall between September and December. An additional wet season sampling event will be undertaken near the start of the wet season in January or February. Only surface water and sediment will be obtained in the January/February event to attempt to obtain first flush samples. Groundwater and seepage water will not be sampled.

1.1 Purpose & Objectives

The objective of the OMP SAQP is to present the specific monitoring locations, sampling methodologies and quality control / quality assurance measures for the monitoring of the concentrations and extent of PFAS in groundwater, seepage water, surface water and sediment originating from the site. These findings will inform risk management decisions by Defence and the Western Australian Government to protect human health and the environment.

The specific purposes of the monitoring specified in the OMP is to:

1. Evaluate the nature and extent (spatial and temporal) of PFAS impact in groundwater and surface water pathways associated with site sources of PFAS derived from AFFF;
2. Monitor the migration of PFAS in groundwater and surface water from the site;
3. Provide confirmation of the current understanding of risk; and
4. Provide supporting data for assessment of management actions, where relevant.

1.2 Previous Reports

The following key reports prepared in relation to the HEH-A PFAS investigation have been used as a basis to develop this SAQP:

- Department of Defence, March 2019, Naval Communication Station Harold E Holt – Area A *PFAS Management Area Plan*.
- Department of Defence, May 2019, Naval Communication Station Harold E Holt – Area A *PFAS Ongoing Monitoring Plan*.
- GHD Pty Ltd, December 2018, reference: 3135526, *Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report*.
- GHD Pty Ltd, April 2019, reference: 3135526, *Harold E Holt A Ecological Risk Assessment*.
- Cardno, April 2020, *PFAS OMP Biannual Monitoring Factual Report, 2019 Post-Winter, HEH-A*.
- Cardno, July 2020, *PFAS OMP First Flush Sampling Event Factual Report, May 2020, HEH-A*.
- Cardno, February 2021, *PFAS OMP Biannual Monitoring Factual Report, 2020 Post-summer, HEH-A*.
- Cardno, February 2021, *PFAS OMP Biannual Monitoring Factual Report, 2020 Post-winter, HEH-A*.
- Cardno, May 2021, *PFAS OMP First Flush Sampling Event Factual Report, March 2021, HEH-A*.

- Cardno, June 2021, *2020 Annual Interpretive Report, HEH-A*.
- Cardno, August 2021, *PFAS OMP Biannual Monitoring Factual Report, June 2021, HEH-A*.
- Cardno, March 2022, *PFAS OMP Biannual Monitoring Factual Report, November 2021, HEH-A*.
- Cardno, September 2022, *PFAS OMP First Flush Sampling Event Factual Report HEH-A, May 2022, HEH-A*.
- Cardno, now Stantec, October 2022, *PFAS OMP Biannual Monitoring Factual Report, June 2022, HEH-A*.
- Cardno, now Stantec, February 2023, *PFAS OMP Biannual Monitoring Factual Report, November 2022, HEH-A*.
- Cardno, now Stantec, March 2023, *Draft 2021 Annual Interpretive Report*, HEH-A.

1.3 Responsible Parties

Responsible parties and responsibilities associated with the implementation of the OMP are detailed in Table 1-1.

Table 1-1 Responsible Parties

Role	Responsibilities
Department of Defence – Directorate of PFAS Remediation (DPFASR) – Environment & Engineering Branch	▪ Implement this OMP. ▪ Engage suitably qualified environmental consultants/contractors to carry out the works specified in the OMP
HEH-A – Base Support Manager / Site Manager and Environment and Sustainability Manager	▪ Review and approve all necessary permits required for implementation of the works outlined in the OMP.
Environmental Consultant	▪ Obtain necessary permits from HEH-A to implement the works outlined in the OMP. ▪ Liaise with State regulators (e.g. Department of Biodiversity, Conservation and Attractions) to arrange sampling of off-site waterways, as required. ▪ Undertake the monitoring activities outlined in this SAQP. ▪ Produce a monitoring report that summarises the data and findings of each monitoring event and is consistent with the requirements of this SAQP. ▪ Produce an annual interpretive report including recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP. ▪ Upload analytical data from each monitoring event to the relevant Defence ESdat database.

1.4 Relevant Guidelines

This SAQP has been prepared in general accordance with the WA *Contaminated Sites Act 2003* (CS Act), applicable industry standards and guidelines relevant to an assessment of this type, and has been formulated in reference to the following:

- National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013)* (ASC NEPM).
- Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) 2.0*.
- Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds*.
- Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.

- Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*
- Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
- U.S. Environmental Protection Agency (EPA), 2000, '*Guidance for the Data Quality Objectives Process (EPA QA/G-4)*'.
- USEPA, 2002, '*Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.*
- Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*[1].
- National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

1.5 Standards of Assessment and Limitations

This SAQP has been prepared in general accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report.

The scope presented in this SAQP report are derived only from available desk-based information and site inspection undertaken. This SAQP is not any of the following:

- A Mandatory Audit Report (MAR) or Voluntary Audit Report (VAR) as defined under the *Contaminated Sites Act 2003* (CS Act).
- A Geotechnical Assessment.
- A Detailed Site Investigation (DSI).
- A Detailed Hydrogeological Assessment.
- A Remediation Action Plan (RAP) or Site Remediation & Validation (SRV) report.
- A Site Management Plan (SMP).

[1] It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site locations.

2 Site Description and Management Areas

HEH-A is located approximately 1,250 km north of Perth, 14 kilometres north of Exmouth township, and covers an area of 2,310 hectares (ha). HEH-A was established in 1967 and is host to a VLF antenna field and associated infrastructure including a central transmitter building, power station, fuel farms, fuel pipelines, Murat Pier and saltwater bore field.

The site is situated at the end of the North West Cape of WA, at the northern edge of Exmouth. HEH-A encompasses the waters extending 400 m around the Point Murat Pier. The majority of the buildings and associated infrastructure and support services are located in the eastern portion of the site and include:

- VLF transmitter Station.
- Bulk fuel storage, referred to as the Petrol Oil Lubricants (POL) store.
- Bulk fuel storage at the ready use fuel farm (RUFF) above ground storage tanks (ASTs) at the power station.
- Point Murat Pier – diesel fuel supplied by ships berthed at Point Murat Pier and transferred via pipeline (above and below ground) to the POL and ready storage facility adjacent to the power station.
- Power station.

2.1 Site Definition and Planning

The site location is presented on Figure 1, Appendix A. Key site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Site Address	Murat Rd, North West Cape, WA 6707
Land Description	Harold E Holt Area A
Owner	Commonwealth of Australia
Title Details	Lot 44 on Plan P209471
Planning Zone / Land use	Public Purposes – Government Services
Local Government Authority (LGA)	Shire of Exmouth
Boundary corner coordinate (1) **(eastings and northings in GDA94, Zone 50)**	▪ North corner: 201,817 mE, 7,588,922 mN ▪ East corner: 209,638 mE, 7,585,003 mN ▪ South corner: 206,410 mE, 7,581,168 mN ▪ West corner: 203,378 mE, 7,585,914 mN

(1) As determined by Cardno

2.2 Surrounding Land Uses and Zoning

The surrounding land uses are outlined in Table 2-2.

Table 2-2 Surrounding Land Uses

Direction	Land Use
North	Ningaloo Marine Park
West	Ningaloo Marine Park
East	Ningaloo Marine Park/Exmouth Gulf, commercial prawn fishing
South	Bundegi Coastal Park and vacant crown land (open space)

3 Environmental Setting

Key details defining the site are summarised in Table 3-1.

Table 3-1 Key Site Details

Setting	Description
Climate	The region has a hot, semi-arid climate, with a wet and dry season. The maximum temperatures range between 37.9ºC (January) and 24.2ºC (July) while minimum temperatures range between 11.4ºC (July) and 24.7ºC (February). Rainfall occurs generally between January and July with monsoonal showers between January and Late April. August to December is generally dry. The highest volume of rainfall typically occurs during the month of June with a mean monthly rainfall amount of 43.5 mm.
Topography	Elevation across HEH-A typically range between 1 and 20 meters relative to the Australian Height Datum (m AHD). To the East of HEH-A, the coastline is comprised of sand dunes which have a maximum elevation of 20 mAHD. The dunes have a succession profile of primary and secondary dunes, which increase in elevation with distance from the coast.
Geology	**Regional Geology** The site is underlain by the geological units of the Northwest Cape range primarily comprising carbonate sediments. The Cape Range Group consists in: ▪ Trealla Limestone: permeable, hard and tightly jointed limestone beneath unconsolidated Quaternary deposits. Contains both karst areas and areas of recrystallization. ▪ Tulki Limestone: relatively permeable, hard and tightly jointed. Encountered at depths of 50 to 100 m below ground level (mbgl). Karst features such as caves occur within the recrystallised limestone. ▪ Mandu Limestone: low permeability limestone encountered at greater than 150 mbgl. ▪ The Birdrong Sandstone which underlies the Cape Range Group, comprising a fine to coarse grained silty sandstone. **Site Specific Geology** Previous environmental investigations have reported that the geology at HEH-A is primarily a clay pan, comprising silt, sand and gravels. The clay pan encompasses the majority of the far north eastern tip of the peninsula and is fringed along the coast to the north and east of the site by extensive beach and coastal dunes.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates that most of the area encompassing the site is classified as having either a high to moderate or moderate to low risk of ASS occurring.
Hydrology	HEH-A can be inundated by sea water during extreme storm surges. Later evaporation of this water has left visible salt crusts and localised hypersaline conditions. The coastal send dunes and inland topographical depression that characterise HEH-A, effectively form a basin where, in the absence of drainage pathways to the coast, surface water can stand for up to several months following substantial rainfall events and storm surges. Site drainage primarily follows the local topography, prior to infiltration into the ground surface.
Hydrogeology	The Quaternary and Tertiary-aged sediments are hydraulically interconnected and together form the major, unconfined aquifer of the area. The superficial Quaternary layers (dunes, colluvium, alluvium) are considered to be no more than 20 m in thickness. ▪ **Groundwater Occurrence/Quality** – The main regional aquifer occurs predominantly within the Tulki Limestone (within permeable beds and the karst system) on the flanks of the Cape Range and the Mandu Limestone (within joints and minor permeable beds) on the crest of the Cape Range. The aquifer is unconfined and is recharged by rainfall. Groundwater in the Quaternary units is considered to be perched and discontinuous. The coastal dunes may also contain relatively fresh groundwater, however of limited extent (lenses), but may influence groundwater flow directions locally. The groundwater underlying the clay/salt pan is hypersaline due to the clay pan acting as an evaporation basin where salts are concentrated. Brackish groundwater conditions exist

Setting	Description
	around the power station and POL areas, which may indicate an interaction with fresher recharge source. ▪ **Depth to Groundwater** – Groundwater has previously been recorded beneath the site at shallow levels of between -0.128 and 0.675 m AHD (i.e. less than 7 m below ground level) (GHD, 2018). The hydraulic gradient of the site is low (in the order of 0.0002 to 0.003 m/m). The groundwater is therefore likely to be vulnerable to local changes in flow direction through preferential recharge. ▪ **Groundwater Flow Direction** – The groundwater elevation contour pattern (GHD, 2018) indicated a generally consistent groundwater flow direction from the sand dunes towards the central clay pan area (i.e. westerly direction for eastern portions of the Base, and easterly flow direction on the west). ▪ **Groundwater Use** – No registered groundwater bores were identified within a 1 km radius of HEH-A. A number of unregistered extraction bores are understood to be present at residential properties within the township of Exmouth, located approximately 14 km south of the site. – Saltwater production bores are installed within the Trealla Limestone to the south-east of the power plant compound area. Groundwater is continuously pumped from this borefield, which may be responsible for localised deviations in the groundwater elevation contours near the south-east portion of the site. ▪ **Protective Drinking Water Source Area (PDSA**) – The site is not located within a PDSA, The Exmouth Water Reserve drinking water source protection review Area, a Priority 1 area, is located approximately 12 km southwest of the site at its closest point. Priority 1 areas are usually undeveloped and under state management. ▪ **Receiving Surface Water Body** – A component of flow from the sand dunes towards the coast is present on the eastern coats near Murat Pier, although this is reversed at high tide, such that groundwater discharges over full tidal cycles may be minimal. Previous investigations reported a very low hydraulic gradient for the site.
Environmental Sensitive Areas	The site occurs within an area that is included on the Register of the National Estate because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth. ▪ The Cape Range Subterranean Waterways wetlands occurs across the site. ▪ The Cape Range National Park is located approximately 16 km to the southwest of the site at its closest point. ▪ The Jurabi Coastal Park is adjacent to the west of the site. ▪ The Bundegi Conservation Reserve is adjacent to the southeast of the site. ▪ The Ningaloo Coast, a World Heritage listed site is located within 10km of HEH-A. The Ningaloo Coast is also listed on the National Heritage Property register.
Wetlands	▪ The site occurs within the Cape Range subterranean Waterways wetland, listed under the Directory of Important Wetlands.
Further information can be found in the DSI report (GHD 2018).	

4 Source Areas and Risk

The site has been subject of numerous PFAS investigation reports, including:

- Coffey 2011, limited Groundwater Monitoring Event Report - Naval Communication Harold E Holt: Area A and Area B,
- Aurecon 2016, limited Groundwater Monitoring Event Report - Naval Communication Harold E Holt: Area A and Area B.
- A Preliminary Site Investigation and Sampling Analytical and Quality Plan (GHD 2018 PFAS Site Investigations Naval Communication Station Harold E Holt – Preliminary Site Investigation and Sampling Analytical and Quality Plan);
- A Detailed Site Investigation (GHD December 2018, reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report').
- An Ecological Risk Assessment (GHD 2019).

4.1 Source Areas

Three main source areas were identified at the site. These included the Petrol Oil and Lubricant (POL) storage area, Powerhouse and, to a lesser extent, Murat Pier (Figure 2, Appendix A). Detectable concentrations of PFAS were identified in all environmental media tested – soils, sediments, surface water (where present) and groundwater.

5 Data Quality Objectives

Development of data quality objectives (DQOs) for the OMP SAQP is based on guidance presented in the ASC NEPM (NEPC 2013) and are consistent with 'Naval Communication Station Harold E Holt Area A PFAS Ongoing Monitoring Plan' (2019). The DQO process comprises the following seven steps:

- Step 1: State the problem
- Step 2: Identify the decision/principal study question(s)
- Step 3: Identify the Inputs into the Decision
- Step 4: Study Boundaries
- Step 5: Decision rules
- Step 6: Tolerable limits on decision errors
- Step 7: Optimisation of the data collection process

The DQOs are detailed in Table 5-1.

Table 5-1 Data Quality Objectives

Data Quality Step	Description
State the Problem	The DSI (GHD 2018) identified PFAS in groundwater, surface water and sediment within the Management Area at concentrations exceeding the relevant assessment levels. The highest concentrations were mostly contained to, around the source areas. The DSI together with the subsequent preliminary ERA (GHD, 2019) reported that the presence of PFAS on and in the areas surrounding the Base were of low risk to receptors. **Groundwater and seepage water** PFAS was detected in groundwater on both the north and the west side of the site. PFAS concentrations in groundwater vary both vertically within the groundwater profile and laterally across the site. Although groundwater flow is generally inland, radial flow to the coast may occur at times of flooding of the salt pan. **Surface Water** PFAS concentrations in surface water exceeding human health screening levels protective of recreational uses have been identified in a number of areas across the site including the powerhouse and POL fuel farm. **Sediment** In general, PFAS concentrations in surface soils were higher in the source areas; however, the concentrations were below the screening criteria relevant to ecological or human health risks with the exception of three sample locations at the POL Fuel farm. Sediment can however be mobilised into surface drains and can migrate off-site to Exmouth Gulf. PFAS sorbed to sediments are also prone to dissolution in surface waters. There are currently no Australian endorsed assessment levels for PFAS in sediment. Whilst the findings of the Preliminary ERA (GHD, 2019) recognised that an adverse ecological impact is unlikely, a robust dataset is required to assess trends in the nature, extent and magnitude of PFAS concentrations within sediment, surface water and groundwater to validate/improve the understanding of the CSM in relation to spatial and temporal variability of PFAS concentrations within the Management Area and associated receptors.
Identify the decision/principal study question(s)	This OMP is to provide further data to assess the following principal study questions: ▪ What are the changes and trends in the nature, extent and magnitude of PFAS concentrations in the groundwater, surface water and sediment within the Management Area? ▪ Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant a revision of the level of risk? ▪ Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant refinement of any existing management measures?

Data Quality Step	Description
Identify the Inputs into the Decision	The following inputs are required to resolve the principal study questions outlined in Step 2: ▪ PFAS concentrations in groundwater, surface water and sediment from previous and future monitoring events. ▪ Field data (i.e. groundwater levels, physico-chemical parameters) on groundwater, surface water and sediment from previous and future monitoring events. ▪ An appropriate statistical evaluation of the data (e.g. using Mann-Kendall or similar analysis) including short- and long-term trends, in particular for surface water and groundwater concentrations. ▪ Comparison of data sets to relevant endorsed assessment levels (refer to Section 7).
Study Boundaries	Ongoing monitoring will generally be undertaken within the boundaries of the Management Area (Figure 2, Appendix A) at the groundwater, surface water, seepage and sediment monitoring locations outlined in Sections 6.3.1 and 6.4.1. Monitoring will be undertaken every six months, with one monitoring event post-summer (June) and one post-winter (November) during an initial implementation period of three years. An additional surface water and sediment monitoring event will take place following the first flush immediately (or as close as possible) following the first heavy rainfall event of the wet season (January or February). Section 6.3 provides further detail on the monitoring frequency.
Develop a Decision Rule	▪ The analytical and field data will be used to assess changes to the nature, extent and magnitude of PFAS in surface water, sediment and groundwater and to provide supporting data for assessment of management actions, where relevant. ▪ Trends in PFAS concentrations, including an assessment of temporal and spatial changes, will be assessed using an appropriate statistical analysis approach (e.g. using Mann- Kendall, GWSdat or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed. ▪ The analytical data will be compared to the relevant assessment levels (presented in Section 7) and/or historic concentrations (i.e. maximum concentration) recorded during prior monitoring rounds [i.e. during the DSI (GHD 2018)] to evaluate changes in the risk profile and whether revision of the risk level or implemented management measures is warranted. Where exceedances of adopted assessment criteria levels (presented in Section 7) or new detections are reported, further interrogation of data will be undertaken to the extent relevant to assess the risk profile and location. A summary of the key decision rules as detailed below: 1. Have the analytical data collected as part of the monitoring program met the DQI (refer Table 5-2.below)? If yes, then the data can be used to answer the decision rule below and the decision statements developed in Step 2. If no, then an assessment of the need to collect additional data will be required. 2. Do PFAS concentrations exceed the investigation criteria? If no, then the contamination would be considered not to pose an unacceptable risk. Where results exceed the adopted investigation criteria, this may not necessarily indicate an unacceptable level of risk. Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. 3. Has PFAS been detected in any of the off-site bores previously not detected? If yes, do PFAS concentrations reported indicate an increasing trend and/or exceed historic maximum concentrations? Do results indicate a potential risk to associated receptors (e.g. local ecosystems) including associated risks that PFAS may present towards human receptors. Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. 4. Has PFAS been detected in onsite drainage channels and offsite seepage water within the management areas? If yes, do PFAS concentrations reported indicate an increasing trend or exceed historic maximum concentrations? Do results indicate a potential risk to receptors and changes to the risk profile? Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts.

Data Quality Step	Description
	The Annual Interpretive Report will review the results obtained against these triggers/decisions.
Specify Limits on Decision Error	The potential for significant decision errors will be minimised by completing a robust QA/QC program in accordance with DWER and NEPM guideline requirements. Standard operating procedures will be closely followed in the field to ensure accurate and representative data acquisition. DQIs will be applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision error is 95% compliance with the applied DQIs (see Table 5-2). If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of the non- conformance and any corrective actions.
Optimise the Design for Obtaining the Data	The design of the OMP has been made in consideration of historical activities at the site, historical investigations (and findings i.e. PSI, DSI and ERA), in the context of developing responses to the principal study questions outlined in Step 2 and to meet the DQOs ensuring that a representation of the current site condition can be achieved. The OMP scope is outlined in Section 6. The available data will be reviewed and evaluated to determine if the frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors. As additional information is gathered during the course of this investigation/monitoring, it may be beneficial for the proposed scope of works to be altered from the initial design. Changes to the proposed monitoring, if considered necessary, will be made based on risk profile reviews and updated CSM and in consultation with Defence. Other factors that will optimise the design for obtaining data will include the use of laboratories that are NATA accredited for PFAS analysis and ensure laboratory LORs are suitable to meet the relevant adopted assessment levels (where possible), experienced field scientist(s), robust field and laboratory quality assurance/quality control protocols are adopted, and Field and analytical data are collected in accordance with the PFAS NEMP 2.0 (HEPA 2020), ASC NEPM (NEPC 2013) and the assessment of contaminated sites (DWER 2021).

An assessment of the Data Quality Indicators (DQIs) relating to both field and laboratory procedures will be undertaken with appropriate documentation provided for each environmental element or media assessed. The DQIs adopted for the DSI are summarised in Table 5-2.

Table 5-2 Data Quality Indicators

Data Quality Indicator	Detail
QA Documentation	Provision of appropriate work plans, DQI and DQO defined for the site and all QA/QC aspects documented.
Bias	A measure of the potential distortion in an analysis which can result in errors in one direction (e.g. one laboratory consistently higher results or consistent poor spiked matrix recovery). Bias will be assessed with reference to the analysis of spiked matrix samples (NEPC 1999b).
Representativeness	A qualitative measure of the confidence that data is representative of each medium present on the site. Use of appropriate and documented sampling methods, sampling handling, preservation and transport and holding times.
Precision:	A quantitative measure of data variability or reproducibility, measured by the calculation of %RPD values for duplicate samples (i.e. measure of agreement). Precision in DQI is considered an important assessment in an environmental study (USEPA, 2002, Guidance on Environmental Data Verification and Data Validation). It can be measured as follows: ▪ Percentage of the mean of the measurement such as Relative Percent Difference (i.e. %RPD). The %RPD will be calculated for the field and secondary duplicate (i.e. inter and intra-laboratory analysis); and ▪ Use of similar analytical method and instrument (e.g. for inter-laboratory assessment). The %RPD will be considered as acceptable if the values are:

<table>
<tr><th>Data Quality Indicator</th><th>Detail</th></tr>
<tr><td></td><td>
<table>
<tr><th>Magnitude of result</th><th>Acceptable RPD range</th></tr>
<tr><td><10 x limited of reporting (LOR)</td><td>No limits</td></tr>
<tr><td>10 – 20 x LOR</td><td>0% - 50%</td></tr>
<tr><td>>20 x LOR</td><td>0% - 20%</td></tr>
</table>
Should there be a result that is greater than acceptable RPD range, then a “review should be conducted of the cause (e.g. instrument calibration, appropriateness of method used)” (NEPC, 2013).
For the purpose of this OMP, field and secondary duplicates should be collected at a rate of 1 in 10 samples (HEPA 2020 and GHD, 2018).</td></tr>
<tr><td>Accuracy</td><td>A quantitative measure of the closeness of data to a ‘true value’, measured by the analysis of spike, blank and laboratory control samples (LCS). The LCS consists of a standard reference material or a matrix of known concentration.
For the purpose of assessing accuracy it is required that at least one LCS for each process batch [2] be analysed (NEPC, 2013).</td></tr>
<tr><td>Comparability</td><td>A qualitative measure of the confidence that data may be considered to be equivalent for each sampling and analytical event. By use of standard procedures, comparable methods, qualified personnel and review of sample integrity.</td></tr>
<tr><td>Completeness</td><td>A measure of the amount of usable data (expressed as a percentage - %) from a data collection activity, based on completeness of test program, overall QA/QC completeness and validity of data set.</td></tr>
</table>

[2] The NEPM Schedule B3 – *Guideline on Laboratory Analysis of Potentially Contaminated Soil* defines a laboratory process batch to consist of up to “*20 samples that are similar in term of matrix and test procedure, and are processed as one unit for the QC purposes*” (NEPC, 2013).

6 Ongoing Monitoring Program

6.1 OMP SAQP History

The changes made to the OMP SAQP since the Rev1 are documented in Table 6-1.

Table 6-1 OMP SAQP History

SAQP Version	Date	Report Section	Changes	Justification
Rev 2	18/06/2020	7	Update of assessment criteria and reference to HEPA (2020). Well ID update as per DCARM update	New guideline (HEPA, 2020) DCARM update
Rev 3	14/05/2021	6.3	Table 'Wells construction details' added.	Defence review
		6	Methodology tables updates	
Rev 4	14/06/2021	-	Correct typos throughout and minor updates	Defence review
Rev 5	01/11/2022	6.3	Methodologies updates	Defence review
Rev 6	27/02/2023	6, 9	Methodologies and references updates. Removal of MW123 which became inaccessible. Addition of alternative locations for SW112/SD112 and SW120/SD120 which became inaccessible.	Defence review
Rev 7	01/06/2023	-	Formatting and minor updates	Defence review and SAQP update

6.2 Management Area Description

The OMP includes sampling and analysis not only from the site, but also from a number of surrounding (off-site) waterways, groundwater bores and seepage locations. The site and these surrounding areas are collectively referred to as the "Management Area". The Management Area boundaries are presented on Figure 2, Appendix A.

The 'Management Area' includes:

- The source areas (as described in Section 4.1)
- Land surrounding the site to the coastline.

6.3 Groundwater Monitoring

6.3.1 Groundwater Monitoring Network

The groundwater monitoring network, sampled as part of the DSI (GHD 2018), includes 46 single level monitoring wells and 16 multilevel wells. The network of groundwater monitoring locations are summarised in Table 6-2 and Table 6-3.

Table 6-2 HEH-A Groundwater Monitoring Network (single-level)

Area	Average screen interval (mBGL)	Monitoring Well / Bore ID
Powerhouse	2.0 – 6.0	MW213; MW027; MW101; MW102; MW103; MW019; MW021; MW205; MW215; MW126;
Fuel Farm	2.0 – 5.0	MW218; MW210; MW211; MW212; MW003; MW006; MW007; MW008; MW023;

Area	Average screen interval (mBGL)	Monitoring Well / Bore ID
Powerhouse pathway	3.0 – 6.0	MW012; MW013; MW014 MW015; MW017 MW214; MW217; MW218;
Fuel farm pathway	2.0 – 5.0	MW202; MW010; MW020; MW024;
Broader area	2.0 – 5.0	MW001; MW009; MW118; MW119; MW120; MW121; MW122; MW123; MW124; MW125; MW127; MW128; MW131; MW133; MW134

Table 6-3 HEH-A Groundwater Monitoring Network (Multi - Level)

Well ID	Screen interval (mBGL)	Time Sampled	Concentration Range (GHD, 2018)		
			Sum of PFHxS + PFOS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
MW104	3.5 – 4.0	1	0.004	**0.001**	ND
	5.5 – 6.0	2	0.002 – 0.005	ND – **0.002**	ND – 0.003
	7.5 – 8.0	2	ND – 0.002	ND – **0.002**	ND – 0.001
	9.5 – 10.0	2	ND	ND	ND
MW105	2.0 – 2.5	1	1.2	**0.68**	0.29
	4.0 – 4.5	2	0.2 – 0.25	**0.15** – **0.20**	0.007 – 0.021
	6.0 – 6.5	2	0.11 – 0.2	**0.040** – **0.067**	0.004 – 0.02
	8.0 – 8.5	2	ND – 0.038	**0.007** – **0.008**	0.002 – 0.003
MW106	4.5 – 5.0	1	0.002	**0.002**	ND
	6.5 – 7.0	1	ND	ND	ND
	8.5 – 9.0	1	ND	ND	ND
MW107	3.1 – 4.1	1	0.4	**0.22**	0.016
	5.5 – 6.0	2	ND – 0.004	**0.004** – **0.013**	ND
	7.5 – 8.0	2	0.1 – 0.177	**0.088** – **0.15**	0.003 – 0.008
MW108	2.0 – 2.5	1	0.082	**0.028**	0.009
	3.7 – 4.2	2	0.521 – 0.6	**0.081** – **0.12**	0.032 – 0.037
	5.5 – 6.0	2	0.3 – 0.33	**0.020** – **0.04**	0.013 – 0.014
MW109	6.5 – 7.0	2	ND	<0.0002	ND
	9.3 – 9.8	2	ND – 0.002	<0.0002 – **0.002**	ND
MW110	7.5 – 8.0	2	ND – 0.002	<0.0002	ND
	9.0 – 9.5	2	ND – 0.007	<0.0002 – **0.004**	ND – 0.002
MW111	8.5 – 9.0	2	ND – 0.004	**0.002** – **0.007**	ND – 0.001
	10.5 – 11.0	2	ND – 0.009	**0.006** – **0.012**	ND
MW112	2.0 – 3.0	2	ND – 0.009	**0.005** – **0.007**	ND
	4.5 – 5.0	2	ND	<0.0002	ND
	6.5 – 7.0	2	ND	<0.0002 – **0.002**	ND

Well ID	Screen interval (mBGL)	Time Sampled	Concentration Range (GHD, 2018)		
			Sum of PFHxS + PFOS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
	8.5 – 9.0	2	ND – 0.001	<0.0002 – **0.001**	ND
MW113	2.5 – 3.5	2	ND	<0.0002	ND
	5.0 – 5.5	2	ND	<0.0002	ND
	7.0 – 7.5	2	ND	<0.0002	ND
MW114	2.0 – 3.0	2	ND – 0.002	<0.0002	ND
	4.5 – 5.0	2	ND	<0.0002	ND
	6.5 – 7.0	2	ND – 0.002	<0.0002 – **0.002**	ND
	8.5 – 9.0	2	ND	<0.0002	ND
MW115	2.0 – 3.0	2	ND – 0.002	<0.0002	ND
	4.5 – 5.0	2	ND	<0.0002	ND
	6.5 – 7.0	2	ND	<0.0002	ND
	8.5 – 9.0	2	ND	<0.0002	ND
MW116	1.2 – 2.2	2	ND – 0.003	<0.0002 – **0.003**	ND – 0.001
	4.5 – 5.0	2	ND – 0.002	<0.0002 – **0.002**	ND – 0.001
	6.5 – 7.0	2	ND – 0.002	<0.0002 – **0.002**	ND – 0.001
	8.5 – 9.0	2	ND – 0.003	<0.0002 – **0.003**	ND
MW117	2.0 – 2.5	2	ND	<0.0002	ND
	4.0 – 4.5	2	ND	<0.0002	ND
	6.0 – 6.5	2	ND – 0.002	<0.0002 – **0.002**	ND – 0.001
	7.4 – 7.9	2	ND	<0.0002	ND
MW129	1.5 – 2.0	1	0.012	**0.008**	0.007
	5.5 – 6.0	1	0.016	**0.010**	0.011
	9.5 - 10	1	0.006	**0.018**	0.016
	13.5 – 14	1	0.03	**0.002**	0.014
MW130	1.4 – 1.9	1	ND	<0.0002	ND
	3.4 – 3.9	1	0.007	**0.005**	ND
	5.4 – 5.9	1	0.005	**0.003**	ND
	7.4 – 7.9	1	0.005	**0.005**	ND

Notes:

1. ND: Non Detected = concentration below laboratory limit of reporting
2. **Bold** = exceeds adopted assessment criteria (99% species protection level for fresh and marine water)

It is proposed to monitor a representative sub-set of the monitoring wells as part of the OMP. The groundwater wells and bores selected for monitoring are presented in Table 6-4, along with the rationale for the selection, and are shown on Figure 3, Appendix A. For the multilevel monitoring wells, only the shallowest (non-dry) screened intervals will be sampled. Seepage water sample locations were chosen to assess the inferred groundwater discharge zone along the coast and are shown on Figure 3, Appendix A.

Table 6-4 OMP Groundwater and Seepage water Monitoring Locations

Area	Monitoring Well / Bore ID	Rationale (OMP, 2019)
Powerhouse	MW017; MW027; MW213; MW214; MW104; MW101; MW102; MW103; MW019	Monitoring of these wells will provide a confirmation of overall PFAS impact identified in the DSI (GHD, 2018). Assessment of overall changes in PFAS concentration in the source areas to provide temporal data on depletion of the source zone.
Fuel Farm	MW004; MW008; MW105; MW119; MW212; MW210	
Powerhouse pathway	MW218; MW117; MW217; MW116; MW115; MW114; MW113 **Seepage water** OTH105; OTH106; OTH107; OTH108	Monitoring of these wells will provide a confirmation of overall PFAS impact identified in the DSI (GHD, 2018). Assessment of changes in PFAS concentration and distribution in the main migration pathways. This will also allow for early detection of significant changes in migration so contingencies can be put in place. **Seepage water** Assessment of changes in PFAS concentration at the receptor downgradient from the source area.
Fuel farm pathway	MW107; MW109; MW110; MW111; MW112; MW202 **Seepage water** OTH101; OTH104; OTH103	
Broader area	MW129; MW130; MW134 **Seepage water** OTH102; OTH109; OTH110, OTH113	Confirmation of the presence of low level PFAS in the wider environment.
Murat Pier salt water discharge water	**Seepage water** OTH002	Assessment of possible seasonal changes in water discharged to Exmouth Gulf, which comes from the salt water bore field and the powerhouse water treatment system.

Construction details for the groundwater wells monitored as part of the OMP are provided in Table 6-5.

Table 6-5 OMP Groundwater Monitoring Wells Construction Details

Well ID	Date drilled	Easting[1]	Northing[1]	RL TOC (mAHD)	Depth (mbgl)	Screen interval (mbgl)
MW004	2005	208606.38	7584838.26	2.989	4.5	1.5 – 4.5
MW008	2005	208561.35	7584889.07	2.846	5.5	2.5 – 5.5
MW017	2005	207623.43	7584280.07	3.421	6	3.0 – 6.0
MW019	2005	207775.71	7584407.8	2.955	4.5	1.5 – 4.5
MW027	2005	207731.82	7584346.08	4.499	6	3.0 – 6.0
MW101	2018	207761.021	7584439.324	2.4356	4.5	2.0 – 4.5
MW102	2018	207675.073	7584443.695	2.6924	6	1.0 – 6.0
MW103	2018	207623.767	7584380.205	2.7898	6	1.0 – 6.0
MW104	2018	207930.918	7584229.719	4.0042	4	3.5 – 4.0
				3.9903	6	5.5 – 6.0
				3.9853	8	7.5 – 8.0
				3.9635	10	9.5 – 10.0
MW105	2018	208509.293	7584967.659	3.1221	2.5	2.0 – 2.5
				3.1082	4.5	4.0 – 4.5
				3.0979	6.5	6.0 – 6.5
				3.1131	8.5	8.0 – 8.5
MW107	2018	209352.4198	7584846.3728	4.7144	4.1	3.1 – 4.1
				4.7014	6	5.5 – 6.0
				4.7447	8	7.5 – 8.0
MW109	2018	208773.8324	7585546.1806	7.0426	7	6.5 – 7.0
				7.0413	9.8	9.3 – 9.8
MW110	2018	209172.62	7585288.7584	8.2665	8	7.5 – 8.0
				8.2807	9.5	9.0 – 9.5
MW111	2018	209374.6344	7584934.0695	8.8279	11	10.5 – 11.0
				8.8159	9	8.5 – 9.0
MW112	2018	209082.826	7584635.075	3.0835	3	2.0 – 3.0
				3.0636	5	4.5 – 5.0
				3.0211	7	6.5 – 7.0
				3.0986	9	8.5 – 9.0
MW113	2018	208612.641	7584330.663	2.970	3.5	2.5 – 3.5
				2.9108	5.5	5.0 – 5.5
				2.9418	7.5	7.0 – 7.5
MW114	2018	208509.621	7584226.733	2.9356	3	2.0 – 3.0
				2.9516	5	4.5 – 5.0
				2.9674	7	6.5 – 7.0
				2.9852	9	8.5 – 9.0
MW115	2018	208349.605	7583914.745	2.6281	3	2.0 – 3.0

Well ID	Date drilled	Easting[1]	Northing[1]	RL TOC (mAHD)	Depth (mbgl)	Screen interval (mbgl)
				2.6415	5	4.5 – 5.0
				2.6786	7	6.5 – 7.0
				2.6909	9	8.5 – 9.0
MW116	2018	208211.574	7583720.685	2.3875	2.2	1.2 – 2.2
				2.3885	5	4.5 – 5.0
				2.4312	7	6.5 – 7.0
				2.4417	9	8.5 – 9.0
MW117	2018	208055.731	7583617.473	2.5910	2.5	2.0 – 2.5
				2.6554	4.5	4.0 – 4.5
				2.7296	6.5	6.0 – 6.5
				2.7619	7.9	7.4 – 7.9
MW119	2018	208082.439	7584992.646	3.5069	5.1	2.1 – 5.1
MW129	2018	205780.981	7587282.904	2.0256	2	1.5 – 2.0
				2.0119	10	9.5 – 10.0
				2.0047	6	5.5 – 6.0
				1.9957	14	13.5 – 14.0
MW130	2018	204518.718	7586211.014	2.0160	1.9	1.4 – 1.9
				2.0555	3.9	3.4 – 3.9
				2.0791	5.9	5.4 – 5.9
				2.0866	7.9	7.4 – 7.9
MW134	2018	204175.564	7584792.928	10.0786	12.5	6.5 – 12.5
MW202	1995	209311.08	7585073.67	8.069	9.9	6.9 – 9.9
MW210	2011	208731.85	7584966.2	2.863	4	1.5 – 4.0
MW212	2011	208706.86	7584855.31	3.513	4	1.0 – 4.0
MW213	2011	207842.89	7584322.76	4.490	5.5	2.5 – 5.5
MW214	2011	207826.46	7584246.08	4.290	5.5	2.5 – 5.5
MW217	2011	208158.1	7583914.64	3.658	4.5	1.2 – 4.5
MW218	2011	208043.65	7583746.95	5.137	5.8	2.8 – 5.8

6.3.2 Monitoring Frequency

All groundwater monitoring locations listed in Table 6-4 will be sampled every six months. Sampling will be undertaken post-summer (June) and post-winter (November) to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends.

6.3.3 Groundwater Sampling Methodology

Groundwater sampling methodology are detailed in the following sections.

6.3.3.1 Groundwater Monitoring Wells and Seepage Water

Groundwater monitoring will be undertaken by no purge HydraSleeve® method for the single-level wells, while the multilevel wells will be sampled with a peristaltic pump and seepage water sampling will be conducted through methodology consistent with the 2018 DSI, as detailed in Table 6-6.

Table 6-6 Groundwater Monitoring Wells – Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) will be gauged using an interface probe. All wells will be measured against a specified mark at the top of the well casing. A sub-selection of wells will be gauged during the same tidal period for the purpose of generating the inferred groundwater contours.
Groundwater Field Parameters	For the single level wells, the field parameters will be recorded via a water quality meter from HydraSleeves® or hand bailed water. For the multilevel wells, the field parameters will be recorded with a flow through cell during purging. The following field parameters will be recorded using a water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other), stabilised parameters' measurement will be recorded on field data records. All field instruments (e.g. water quality meter) will be calibrated by the equipment supplier and daily readings of reference solutions (bump tests) completed to optimise the accuracy of the measurements taken.
Deployment and Retrieval of HydraSleeves® (single level well sample collection)	HydraSleeves® will be deployed with top weight sample collection to begin at the lowest point. HydraSleeve® sampling devices will be left in wells for a minimum of 24 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples will be collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples will be discharged immediately (minimise changes in chemistry) via discharge tube. Following sampling, HydraSleeves® will be deployed in preparation for the next OMP monitoring event using the same string for consistency (same depth of sampling i.e. within screen depth).
Peristaltic pump (multi-level well sample collection)	The shallowest (non-dry) wells will be sampled at each location using Teflon-free dedicated and disposable high-density polyethylene (HDPE) tubing coupled to a peristaltic pump system. The groundwater will be purged at a low flow rate of 0.2 L/min. Near-continuous monitoring of SWL and field parameters will be undertaken during purging and post sample collection to ensure limited drawdown effects. The groundwater will be sampled when the field parameters have stabilised, or before drawdown reaches a maximum of 30 cm.
Alternative sampling methodology (hand bailing)	Disposable HDPE hand bailers, attached to a polypropylene string, will be used in the event that the water column isn't sufficient to fill the HydraSleeve®. Purging of the well (removal of 3x well volume) will be undertaken prior to sampling to ensure that a sample representative of the aquifer is taken. Field parameters will be regularly recorded during the bailer purge to confirm field parameter stability is achieved.
Seepage Water Sampling[1]	Sampling will be carried out within a two-hour period; one hour each side of the low tide. Sampling protocol will involve a shallow excavation in the beach sand; just above where inundation by wave action is occurring. In-situ water parameters will be measured from water seeping into the excavation using a calibrated water quality meter following purging (using a dedicated syringe or jug). Sampling containers will be lowered into the exposed seepage water and filled.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions.

Activity	Details
	▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration and daily bump tests records. All sample documentation including field notebooks, reporting records, Chain of Custody (CoC) and equipment calibration certificates and procedures will be retained within project files.
Decontamination procedure	Dedicated HydraSleeves® and single use nitrile gloves will be used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container will be pre-labelled by the laboratory with a unique barcode which will be scanned into a mobile application to generate the CoC. Samples will be collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998).
Laboratory Testing	▪ Full PFAS analytical suite (see Appendix B). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance)
Laboratory Testing – Quality Control	Groundwater QC samples will be collected at the following frequencies as detailed in the OMP (Defence, 2019): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.
Laboratory Accreditation and Limits of Reporting	All groundwater analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins ARL (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

Notes:

1. Cardno notes that the seepage water sampling method detailed in the SAQP is not consistent with the OMP as per Defence directions (via email RE: Justification of time and costs for seepage and multi-level well sampling [SEC=UNCLASSIFIED] dated 11 November 2019)

6.4 Surface Water and Sediment Monitoring

6.4.1 Monitoring Locations

Several surface water and soil locations were sampled as part of the DSI (GHD 2018) on and off-site including:

> On-site drainage channels.

> On-site source areas.

> The clay pan areas

It is proposed to monitor a representative sub-set of the surface water and sediment locations as part of the OMP. The locations selected for monitoring are presented in Table 6-7 along with the rationale for the selection, and are highlighted on Figure 3, Appendix A.

Table 6-7 OMP Surface Water and Sediment Monitoring Locations

Area	Surface water Sampling Location ID	Sediment Sampling Location ID	Rationale (GHD, 2019b)
Broader area	SW126; SW128; SW121; SW131; SW127	SD126, SD128, SD121, SD131, SD127	Confirmation of the presence of low level PFAS in the wider environment.
Powerhouse	SW113	SD113	Confirmation and monitoring of the presence of PFAS in surface water overflowing on to the roadway.

6.4.2 Surface Water and Sediment Monitoring Frequency

The surface water and sediment monitoring locations listed in Section 6.4.1 will be sampled three times per year, as follows:

- Post-summer (June) and post-winter (November) to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends. This monitoring frequency aligns with the climate of the Management Area, which features the highest volume of rainfall typically between January and July and lower rainfall between September and December. This sampling should be conducted in conjunction with the groundwater/seepage monitoring described in Section 6.3
- An additional monitoring event will be conducted immediately (or as close as possible) following the first heavy rainfall event of the wet season in January or February, involving sampling of surface water and sediment locations described in Table 6-7. This would serve to assess the potential increase in PFAS surface water concentrations following 'first flush' rainfall and subsequent timeframe for attenuation to 'long-term average' concentrations.

6.4.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 6-8.

Table 6-8 Surface Water Monitoring

Item	Details
Field parameters	Surface water physiochemical parameters (i.e. pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), and temperature) will be recorded at the time of sampling using a pre-calibrated water quality meter. Field observations such as odours or sheen presence must also be recorded on field sampling sheets.
Sampling Method	Surface water samples will be collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. Where depth permits, the sample container should be positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples will be decanted into the laboratory supplied sample containers. Samples will be collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) *Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*.
Sample Collection	Water samples will be placed directly into appropriately labelled, laboratory supplied sample bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection. Single-use nitrile gloves will be worn during sampling.
Sample identification, preservation, transport and holding times.	Each sample container will be pre-labelled by the laboratory with a unique barcode which will be scanned into a mobile application to generate the CoC.

Item	Details
	Samples will be contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration and daily bump tests records. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Laboratory Testing	Surface water samples will be analysed for the following: ▪ Full PFAS analytical suite (see Appendix B). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride sulfate, alkalinity and ionic balance)
Laboratory Testing – Quality Control	Surface water QC samples will be collected at the following frequencies as detailed in the SAQP: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)].
Laboratory Accreditation and Limits of Reporting	All surface water analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins ARL (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

6.4.4 Sediment Sampling Methodologies

The methodology for sediment sampling is detailed in Table 6-9.

Table 6-9 Sediment Investigation Methodology

Item	Details
Sample Collection	Sediment samples will be collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation. At each sampling location, the sediment sample will be visually assessed and observations (including physical description) recorded on field data sheets.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.

Item	Details
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples will be analysed for the following: ▪ Full PFAS analytical suite (see Appendix B).
Laboratory Testing – Quality Control	Sediment QC samples will be collected at the following frequencies as detailed in the SAQP: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment samples should be sent to a secondary laboratory.
Laboratory Accreditation and Limits of Reporting	All sediment analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins ARL (Perth).

7 Assessment Criteria

7.1 Groundwater and Surface Water

The assessment levels adopted for groundwater and surface water in this OMP are based upon the Heads of Environmental Protection Authorities Australia and New Zealand (2020) PFAS National Environmental Management Plan 2.0 (NEMP; HEPA 2020) and finding of previous site assessment i.e. Detailed Site Investigation (DSI) (GHD 2018). The adopted assessment criteria for groundwater, seepage water and surface water are detailed in Table 7-1.

Table 7-1 Criteria for Groundwater and Surface Water

Location	Adopted Assessment Criteria	
Groundwater	**Human Health**	**Ecological**
On-site and Off-site	**Recreational Use:** ▪ PFOS + PFHxS – 2.0 µg/L ▪ PFOA – 10 µg/L	**99% species protection level for fresh and marine water:** ▪ PFOS – Laboratory LOR* ▪ PFOA – 19 µg/L
Surface Water	**Human Health**	**Ecological**
Off-site	**Non potable use of groundwater (NPUG) and Recreational Use:** ▪ PFOS + PFHxS – 2.0 µg/L ▪ PFOA – 10 µg/L.	**99% species protection level for fresh and marine water:** ▪ PFOS – Laboratory LOR* ▪ PFOA – 19 µg/L

*The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR) and is somewhat impractical. However, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.

7.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment.

8 Reporting

8.1 Factual Reporting

A factual report should be produced at the completion of each monitoring event that summarises the data and findings of each monitoring event. Each factual report will present the findings and contain the following information, in accordance with the Department of Defence (2021) *PFAS OMP Factual Report Guidance*:

- Introduction
- Scope of work completed.
- Description of sampling methodologies used.
- Field observations (e.g. condition of monitoring wells, description of purged water) and water quality parameter measurements.
- Summary of any changes to the monitoring network condition that may affect data integrity, or require rectification works, and recommendations for repair, replacement of decommissioning of a location
- Evaluation of the applicability of adopted assessment levels.
- Review of the suitability of the data for assessment purposes (QA/QC evaluation).
- Summary tables presenting gauged groundwater and surface water levels.
- Presentation of inferred groundwater contours and inferred groundwater flow direction in a figure.
- Summary tables of analytical results in comparison to adopted assessment levels.
- Graphs showing historical concentrations of PFOS, PFOA and PFOS plus PFHxS.
- Laboratory reports, Chain of Custody (CoC) documentation, field sampling records, data validation and QA/QC details, equipment calibration certificates and other relevant documentation.

In the event that further investigation, management and/or remediation are required, recommendations will be presented in a separate ‘technical memorandum’.

8.2 Interpretive Reporting

Upon completion of each year’s monitoring period an interpretive report will be prepared in accordance with the Department of Defence (2022) *PFAS OMP Annual Interpretive Report Guidance*. As a minimum, each interpretive report should include the following:

- The factual information described in Section 8.1.
- Evidence of compliance with the requirements of the SAQP and meeting stated objectives of the OMP.
- Relevant figures depicting sampling locations and site-specific hydrogeological features.
- Laboratory results and analysis including comparison with relevant screening criteria as identified in each OMP.
- Assessment and commentary on appropriate Quality Assurance/ Quality Control (QA/QC) procedures.
- Assessment against the management triggers and contingencies listed in the OMP.
- A discussion of analytical results in relation to the following:
  - Trends in PFAS concentrations, including an assessment of temporal changes and/or changes to the extent of PFAS impacts. Trends should be assessed using an appropriate statistical analysis approach (e.g. using Mann-Kendall or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed.
  - Consideration, based on data trends, as to whether any of the existing remediation / management measures should be re-assessed, with a view to potential modification, supplementation or cessation.
  - Assessment of whether changes to the CSM and/or risk assessment are required.
  - Whether recalibration or changes to the groundwater model are required to provide a better understanding of the potential future extent of PFAS impact in groundwater.

> Based on the data obtained, an assessment of the OMP sampling requirements with a view to establishing whether:
  - The number of locations monitored could be reduced, such as where PFAS concentrations are stable and are considered to present a low risk to receptors.
  - Additional monitoring locations are required, including the installation of new monitoring wells or sampling of additional existing wells (and/or private bores) to provide better understanding of the nature, extent or magnitude of PFAS impacts in a particular portion of the Management Area.
  - The frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors.
  - Monitoring of additional media should be included in the OMP. *For example, if monitoring of surface water demonstrates a trend of increasing PFAS concentrations, or if concentrations significantly greater than those recorded in previous investigations are recorded, then the requirement to conduct monitoring of aquatic biota should be considered (DoD, 2019).*

> An overview of remedial works or construction and maintenance activities undertaken in the management area during the reporting period, which may impact the CSM.

> A statement as to whether the risk profile has changed overall, or for any specific location at the site, and a recommendation as to whether this should trigger an OMP and/or PMAP review, or other action.

9 References

General References

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APPENDIX

A

Figures

FIGURE 1

1:100,000 Scale at A3

Metres

0 1,500 3,000

Site Location

SAMPLING AND ANALYSIS QUALITY PLAN
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-02-23 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

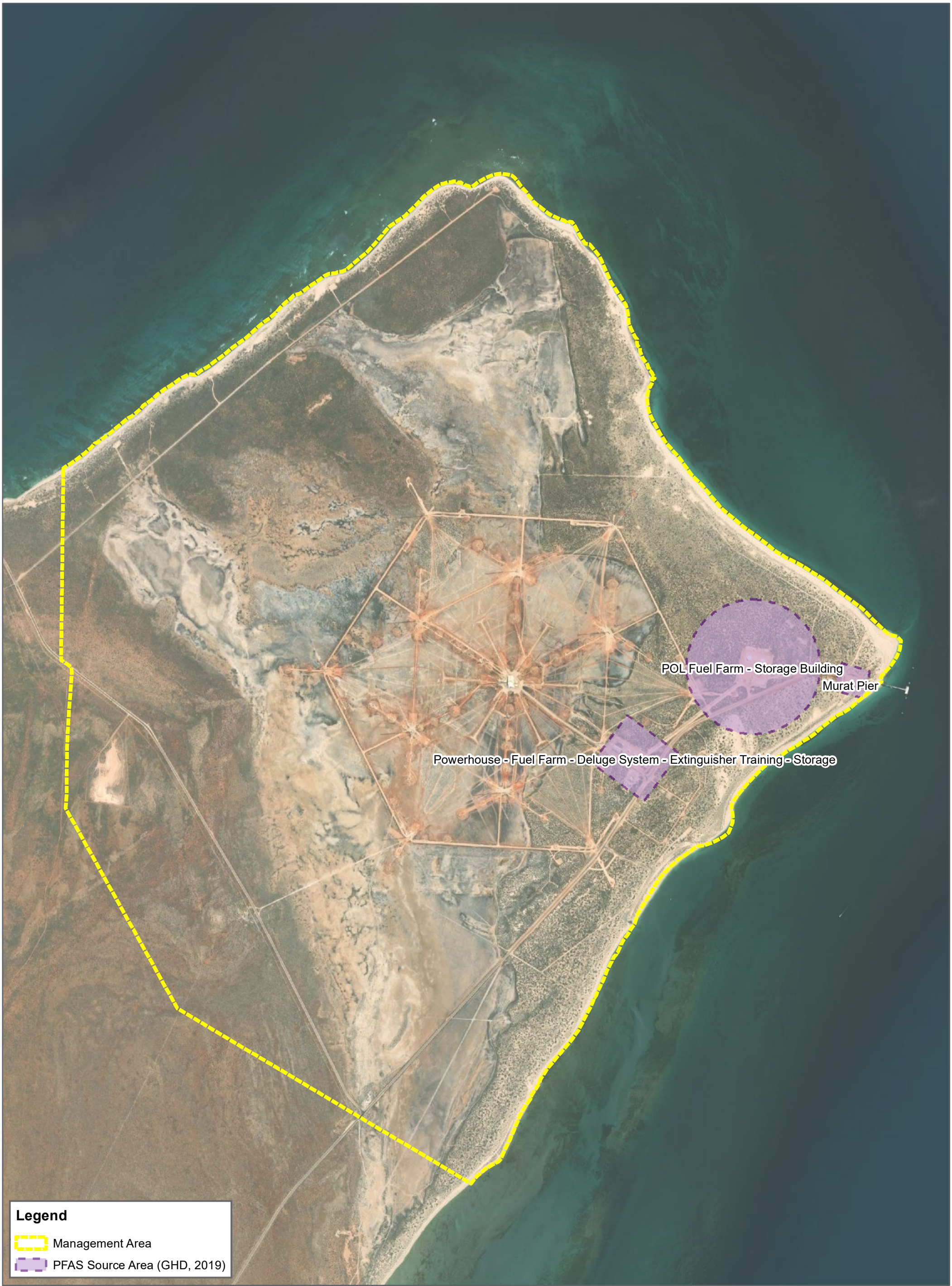

FIGURE 2

1:25,000 Scale at A3

Metres

0 500 1,000

Management Area

SAMPLING AND ANALYSIS QUALITY PLAN
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-02-27 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 02.mxd

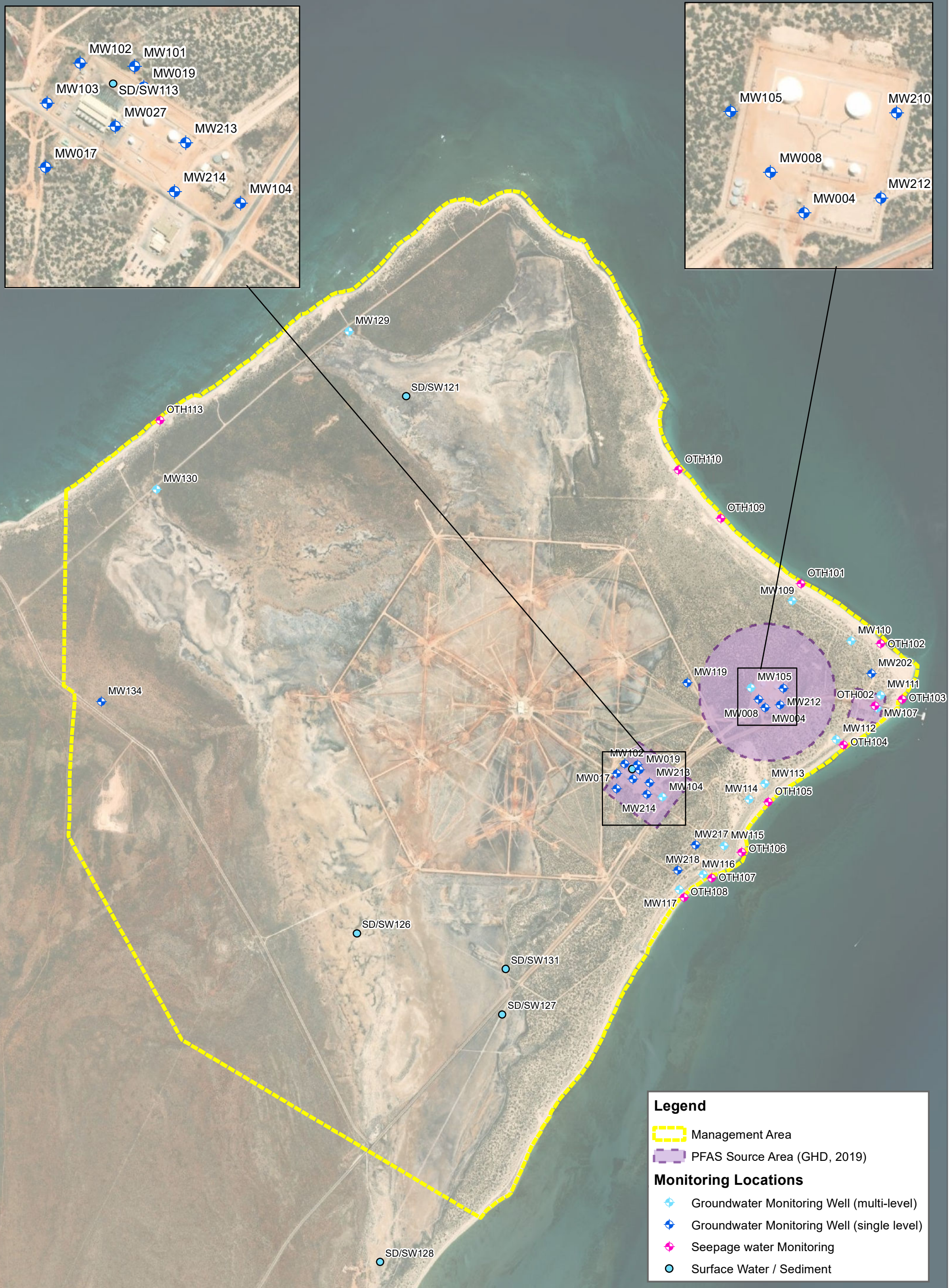

FIGURE 3

1:25,000 Scale at A3

Metres

0 500 1,000

Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-05-30 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_MonitoringLocations 03.mxd

APPENDIX

B

Full PFAS Analytical Suite

Full PFAS Analytical Suite

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

APPENDIX

C

FACTUAL REPORTS

Cardno

now

Stantec

PFAS OMP Biannual Monitoring Event Factual Report

November 2022

Naval Communication Station Harold E Holt Area A

Prepared for

Department of Defence

15 February 2023

Cardno

now

Stantec

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)

Technical Terms

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Assessment
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
HEPA	Heads of Environmental Protection Authority
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
SWL	Standing Water Level

Units

ha	Hectares
mAHD	Metres relative to the Australian Height Datum
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
meq/L	Milliequivalents per Litre
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µg/L	Microgram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

HEH-A	Naval Communication Station Harold E Holt Area A
OMP	Ongoing Monitoring Plan

1 Introduction

1.1 Background

Cardno, now Stantec ("Cardno") was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) biannual monitoring event at the Naval Communication Station Harold E Holt - Area A ("HEH-A" or "the site"). The site is situated at the end of the North West Cape of Western Australia (WA), at the northern edge of Exmouth (Figure 1, Appendix A).

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

> Cardno, 1 November 2022, Reference: 304700525, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A*. Rev 5

The SAQP was reviewed prior to the monitoring event and the following changes were made:

> The methodology for groundwater field parameters recording was updated.

> MW004 (Fuel Farm) was added to the OMP monitoring network to replace MW003 (destroyed).

For the purposes of this report:

> "the site" was defined as Harold E Holt – Area A.

> "the Management Area" was defined as comprising the site, plus the land extending to the Exmouth Gulf (to the east, north and north-west). The Monitoring Area is presented on Figure 2, Appendix A.

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

> To provide a succinct summary of the November 2022 monitoring event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

> To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

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

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) 2.0*.

> Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 1 - Non-volatile and semi-volatile compounds.

> Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.

> Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

> Department of Water and Environmental and Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*[1].

> Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.

> U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process (EPA QA/G-4)*.

> U.S. EPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

> National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater bores was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The groundwater bores monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 4, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse	MW017; MW019; MW027; MW101; MW102; MW103; MW104; MW123, MW213; MW214	10
Fuel Farm	MW004; MW008; MW105; MW119; MW210; MW212	6
Powerhouse pathway	MW113; MW114; MW115; MW116; MW117; MW217; MW218	7
Fuel farm pathway	MW107; MW109; MW110; MW111; MW112; MW202	6
Broader area	MW129; MW130; MW134	3

2.2 Seepage water Monitoring

Sampling of selected seepage water monitoring locations was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The seepage water locations monitored as part of the OMP are presented in Table 2-2 and are shown on Figure 4, Appendix A.

Table 2-2 Seepage water Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse pathway	OTH105; OTH106; OTH107; OTH108	4
Fuel farm pathway	OTH101; OTH103; OTH104	3
Broader area	OTH102; OTH109; OTH110; OTH113	4
Murat Pier saltwater discharge water	OTH002	1

[1] It is noted that the site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of offsite private properties and waterways.

2.3 Surface water Monitoring

Sampling of selected surface water monitoring locations was performed in general accordance with the SAQP, applying methods set out in Section 3 of this report. The surface water locations monitored as part of the OMP are presented in Table 2-3 and are shown on Figure 4, Appendix A.

Table 2-3 Surface water Monitoring Locations

Monitoring Area	Location ID	Number
Broader area	SW112; SW120; SW126; SW127; SW128	5
Powerhouse	SW113	1

2.4 Sediment Monitoring

Sampling of selected sediment monitoring locations was performed in accordance with the SAQP, applying methods set out in section 3 of this report. The sediment locations monitored as part of the OMP are presented in Table 2-4 and are shown on Figure 5, Appendix A.

Table 2-4 Sediment Monitoring Locations

Monitoring Area	Location ID	Number
Broader area	SD112, SD120, SD126, SD127; SD128	5
Powerhouse	SD113	1

2.5 Data Management

All the data included in the report has been collected, uploaded and reviewed according to the data management requirements of the *Defence Contamination Management Manual* (DCMM Annex L), including:

- The sample naming convention detailed in the DCMM Annex L was used in the field;
- All field data collected was uploaded to the ESdat database;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.6 Deviations from the OMP SAQP

Deviations from the SAQP (Cardno, 2022) for the November 2022 monitoring event are presented in Table 2-5.

Table 2-5 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
SW112/SD112	Not Sampled	Access denied due to asbestos hazard. Medium impact on the OMP, no data collected. Both sediment and surface water sampled previously analysed from this location have reported detectable PFAS concentrations. An alternative sampling location should be considered.
MW123	Not Sampled	Access denied due to asbestos hazard. Limited impact on dataset. No data collected in 2022.
MW217	Not Sampled	Monitoring well was found dry. No impact on OMP, adjacent (<50m) well MW218 was sampled.
OTH002	Not Sampled	Murat Pier saltwater discharge point not flowing. No impact on the OMP.
SW113; SW120; SW126; SW127; SW128	Not Sampled	Monitoring locations found dry. No impact on existing dataset, these locations are often dry during the dry season.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken applying the methods detailed in Table 3-1.

Table 3-1 Groundwater Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) were gauged using an interface probe. All wells were measured against a surveyed mark at the top of the well casing.
Groundwater Field Parameters	Groundwater field parameters were recorded via a water quality meter prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters were recorded: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates are provided in Appendix D.
Deployment and Retrieval of HydraSleeves® (single level well sample collection)	HydraSleeves® were deployed with top weight sample collection to begin at the lowest point. HydraSleeves® sampling devices were left in wells for a minimum of 12 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube. Following sampling, HydraSleeves® were deployed in preparation for the next OMP monitoring event using the same string for consistency between events (same depth of sampling i.e. within screen).
Peristaltic pump (multi-level well sample collection)	The shallowest (non-dry) wells were sampled at each multi-level well location using Teflon-free dedicated and disposable high-density polyethylene (HDPE) tubing coupled to a peristaltic pump system. The groundwater was purged at a low flow rate of 0.2 L/min. SWL and field parameters were measured during purging and post sample collection to ensure limited drawdown effects. The groundwater was sampled when the field parameters had stabilised.
Alternative sampling methodology (hand bailing)	Disposable HDPE hand bailers, attached to a polypropylene string, were used when the water column wasn't sufficient to fill the HydraSleeves®. Purging of the well (removal of 3x well volume) was undertaken prior to sampling to ensure that a sample representative of the aquifer is taken.
Decontamination procedure	Dedicated HydraSleeves®/tubing were used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).

Activity	Details
Laboratory Testing	Groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity, and ionic balance). The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins ARL (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Groundwater QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2022): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.2 Seepage water Sampling Methodology

Seepage water monitoring procedure is detailed in Table 3-2.

Table 3-2 Seepage water Sampling Method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: ▪ pH ▪ EC ▪ ORP ▪ DO ▪ Temperature Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Sampling was carried out in a two-hour period; one hour each side of the low tide. Sampling protocol involved a shallow excavation in the beach sand; just above where inundation by wave action is occurring. Sampling containers were lowered into the exposed seepage water and filled.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Seepage water samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).

Activity	Details
Laboratory Testing – Quality Control	Seepage water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2021): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.3 Surface water Sampling Methodology

Surface water monitoring procedure is detailed in Table 3-3.

Table 3-3 Surface water Sampling Method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: ▪ pH ▪ EC ▪ ORP ▪ DO ▪ Temperature Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long handled sampling device. Where water body depth was sufficient, the sample container was positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Surface water samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Surface water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2022): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.4 Sediment Sampling Methodology

Sediment sampling methodology is detailed in Table 3-4.

Table 3-4 Sediment Sampling Method

Activity	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, shovel, etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation. At each sampling location, the sediment sample was visually assessed and observations (including physical description) recorded on field data sheets.
Field Records	The following information was recorded on the field data sheets: ▪ Sampling time and date. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes).
Laboratory Testing – Quality Control	Sediment QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2022): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.5 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

> QA documentation.

> Bias.

> Data Representativeness.

> Data Precision & Accuracy.

> Laboratory Performance.

> Data Comparability.

> Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E.

The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.6 Assessment Criteria

3.6.1 Groundwater, Seepage water and Surface water

The adopted assessment criteria for groundwater, seepage water and surface water are detailed in Table 3-5.

Table 3-5 Criteria for Groundwater, Seepage water and Surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health – Recreational Water	2[1]	10	NHMRC 2019, HEPA 2020
Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

1. Sum of PFOS and PFHxS.
2. PFOS only; Practical screening guideline of 0.01 µg/L is based on typical current laboratory limit of reporting. Therefore, it should be noted that warning and action levels would not be relevant until the detection limits are reduced or the screening levels are increased (HEPA 2020).

3.6.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Sediment results have been compared to available historical data for the purpose of this assessment.

4 Field Observations and Results

4.1 General Observations

No significant weather event or site activities that could have impacted the monitoring event or results obtained were noted during the November 2022 monitoring event. No rainfall occurred leading to or during the November 2022 monitoring event and the daily maximum temperatures varied between 35.1 and 36.9°C.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physicochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling records, included in Appendix D. Groundwater was brackish to saline [total dissolved solids (TDS) ranging from 731 mg/L (MW214) to 35,676 mg/L (MW114)], near neutral to slightly alkaline [pH 7.28 (MW101) to 8.72(MW117)]. Groundwater temperature was on average 27°C, DO readings generally indicate aerobic groundwater condition. Field parameters were consistent with previous monitoring events.

4.2.1.2 Groundwater Elevation and Migration

Groundwater elevation ranged from 0.031 mAHD (MW017) to 1.039 mAHD (MW202). Depth to groundwater was observed to range approximately between 1.7 metres below ground level (mbgl) and 9.9 mbgl.

Groundwater flow direction was interpreted to follow the site topography and be radial from the sand dunes east of site, where mounding is occurring, which is consistent with the previous monitoring events.

Groundwater elevation contours and flow direction are shown in Figure 3, Appendix A. Gauging records are presented in Appendix D.

4.2.2 Groundwater Laboratory Results

4.2.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data in order to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the groundwater monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	10[2]	0.48 (MW017)	30	0
PFOS	MW004, MW008, MW017, MW019, MW027, MW101, MW102, MW103, MW105, MW119, MW210, MW214.	0.01[3]	12.3 (MW017)	30	12
Sum of PFOS and PFHxS	MW017, MW119	2[2]	13.4 (MW017)	30	2

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

> There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the groundwater monitoring locations during the November 2022 monitoring event.

4.2.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 9.98 (MW214) and 580 (MW114) meq/L. Total cations concentrations ranged from 9.05 (MW214) and 675 (MW114) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.3 Seepage Water

4.3.1 Summary of Field Observations

Stabilised physicochemical parameters, water colour and turbidity observations recorded during the seepage water sampling program are presented in field sampling records, included in Appendix D. Water temperature was on average 27.8°C, water condition was slightly alkaline [pH 8.16 (OTH103) to 8.69 (OTH108)], saline [TDS ranging from 34,585 (OTH102) to 35,646 mg/L (OTH106)] and DO readings ranging from 2.88 (OTH107) to 5.84 mg/L (OTH110) indicate aerobic conditions. Field parameters were generally consistent with previous monitoring events.

4.3.2 Laboratory Results

4.3.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the seepage water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-2 Summary of Seepage water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	10[2]	<0.01	11	0
PFOS	-	0.01[3]	<0.01	11	0
Sum of PFOS and PFHxS	-	2[2]	<0.01	11	0

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

> There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the November 2022 monitoring event.

> All samples analysed reported PFAS concentrations below the laboratory LOR.

4.3.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 536 (OTH113) and 618 (OTH110) meq/L. Total cations concentrations ranged from 624 (OTH103) and 725 (OTH105) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.4 Surface water

4.4.1 Summary of Field Observations

All surface water monitoring locations accessed during November 2022 were observed to be dry. No surface water sample was collected during the November 2022 monitoring event.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Appendix B. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA were reported. Figure 5 in Appendix A presents the sediment monitoring locations. The laboratory reports are provided in Appendix C.

Findings are summarised as follows:

- There was no first-time detection of PFOA or Sum of PFOS and PFHxS at the sediment monitoring locations during the November 2022 monitoring event.
- Five out of six sediment samples reported PFAS concentrations below the laboratory LOR.

4.6 Changes to the Monitoring Network Condition

No changes to the monitoring network condition were observed during the November 2022 monitoring event.

The gatic lid of groundwater monitoring well MW008 at the POL storage area has been destroyed and should be replaced to protect the monitoring well's PVC casing.

During the November 2022 monitoring event, access was still denied to MW123 and SD112/SW112 monitoring locations due to asbestos hazard within the low laying areas around the antenna field.

5 Summary and Conclusions

Cardno undertook the November 2022 groundwater, seepage water, surface water and sediment biannual monitoring event at HEH-A as part of the PFAS OMP. Sampling and testing was undertaken at 30 groundwater monitoring bores, 11 seepage water sampling locations and six sediment monitoring locations. Five surface water monitoring locations were found dry and one co-located sediment and surface water monitoring location (SD/SW112) was not accessible due to an asbestos hazard. One groundwater monitoring well (MW123) couldn't be accessed due to the asbestos hazard and one groundwater monitoring well was found dry (MW217).

Groundwater levels were gauged in all wells before sampling. Groundwater flow direction was interpreted to be radial from the site, following the site's topography with mounding occurring beneath the sand dunes, which is consistent with the previous monitoring events.

The groundwater laboratory results reported the following:

- Of the 30 samples that were tested, PFOS (12 samples) and Sum of PFOS and PFHxS (2 samples) reported concentrations that exceeded the HEPA (2020) ecological guideline value for 99% protection species and HEPA (2020) guideline value for recreational use respectively.
- There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the November 2022 monitoring event.

The seepage water laboratory results reported the following:

- All 11 seepage water samples analysed reported PFAS concentrations below the laboratory LOR.
- There was no first-time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the seepage water monitoring locations during the November 2022 monitoring event.

All surface water monitoring locations accessed were observed to be dry. No surface water sample was collected during the November 2022 monitoring event.

The sediment laboratory results reported the following:

- Five out of six sediment samples reported PFAS concentrations below the laboratory LOR.
- There was no first-time detection of PFOA or Sum of PFOS and PFHxS at the sediment monitoring locations during the November 2022 monitoring event.

It is recommended that the gatic lid of groundwater monitoring well MW008 at the POL storage area is replaced to protect the monitoring well's PVC casing.

An alternative monitoring location should be considered in replacement of SD/SW112 inaccessible due to an asbestos hazard.

The next OMP sampling event for HEH-A will be the First Flush 2023 monitoring event. An Annual Interpretive Report will be prepared for the July 2021 – June 2022 monitoring period.

6 References

General References

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3. ANZECC and ARMCANZ, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2018).
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7. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia.
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10. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, *Guidance on Environmental Data Verification and Data Validation.*
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12. National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended), registered May 2013.
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16. U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process* (EPA QA/G-4).
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Site Specific References

18. Cardno, November 2022, Reference: DEF19009, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A*.
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21. Cardno, February 2021, *PFAS OMP Biannual Monitoring Factual Report, 2020 Post Summer, HEH-A*.
22. Cardno, February 2021, *PFAS OMP Biannual Monitoring Factual Report, 2020 Post Winter, HEH-A*.
23. Cardno, May 2021, *PFAS OMP First Flush Sampling Event Factual Report, March 2021, HEH-A*.
24. Cardno, June 2021, *PFAS OMP 2020 Annual Interpretive Report, HEH-A*.
25. Cardno, August 2021, *PFAS OMP Biannual Monitoring Factual Report, June 2021, HEH-A*.
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27. Cardno, September 2022, *PFAS OMP First Flush Sampling Event Factual Report, May 2022, HEH-A.*
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29. Cardno, October 2022, *PFAS OMP Biannual Monitoring Factual Report, June 2022, HEH-A*.

30. Department of Defence, March 2019, *Naval Communication Station Harold E Holt – Area A PFAS Management Area Plan*.

31. Department of Defence, May 2019, *Naval Communication Station Harold E Holt – Area A PFAS Ongoing Monitoring Plan*.

32. GHD Pty Ltd, December 2018, Reference: 3135526,*Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report*.

33. GHD Pty Ltd, April 2019, Reference: 3135526, *Harold E Holt A Ecological Risk Assessment*.

APPENDIX

A

FIGURES

Cardno

now

Stantec

Harold E Holt Area A

North West Cape

Exmouth

Legend

Monitoring Area / Commonwealth boundary

FIGURE 1

1:100,000 Scale at A3

Metres

0 1,500 3,000

Site Location

NOVEMBER 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-02-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 2

1:25,000 Scale at A3

Metres

0 500 1,000

Management Area

NOVEMBER 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-02-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 02.mxd

FIGURE 3

1:25,000 Scale at A3

Metres

0 500 1,000

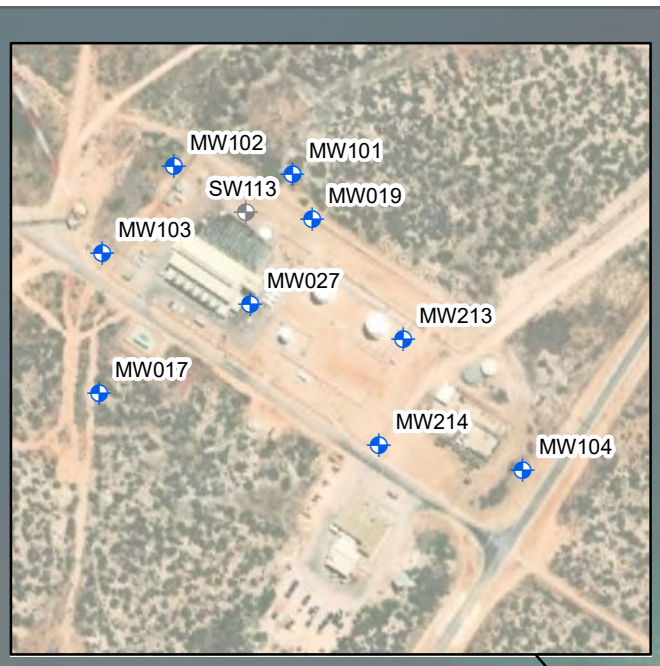
Inferred Groundwater Contours

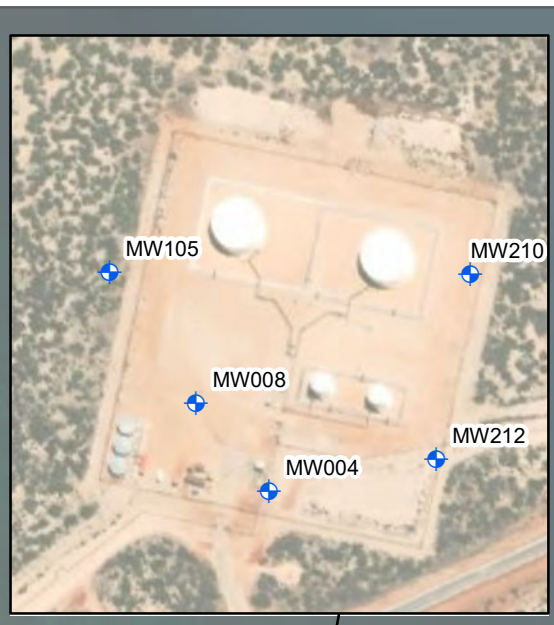
NOVEMBER 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-02-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_Nov-22_GWContours 01.mxd





MW129
OTH113
MW130
SW120
OTH110
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW111
OTH103
MW107
MW112
OTH104
MW134
MW119
MW105
MW212
MW008
MW004
OTH002
MW102
MW019
MW017
MW104
MW214
MW113
MW114
OTH105
MW217
MW115
OTH106
MW218
MW116
OTH108
MW117
SW112
MW123
SW126
SW127
SW128

Legend

- Management Area
- PFAS Source Area (GHD, 2018)

Results Summary

- No first-time detection or new exceedance (42)
- First-time detection of PFOA or PFOS+PFHxS (0)
- New exceedance of guideline value (0)
- Not Sampled (8)

FIGURE 4

1:25,000 Scale at A3

Metres

0 500 1,000

Water Monitoring Locations & Results

NOVEMBER 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-02-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-004_Nov22_W_Results 01.mxd

FIGURE 5

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Monitoring Locations & Results

NOVEMBER 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-02-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-005_Nov22_S_Results 01.mxd

APPENDIX

B

DATA ASSESSMENT TABLES

Cardno

now

Stantec

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids			
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%					0.00023*						19										
PFAS NEMP 2020 Recreational Water											**10**										

Location Code	Date	Field ID	Sample Type	Lab Report No.																			
MW004	25/11/2022	0083_MW004_221125	Normal	EP2215920	<0.02	<0.02	0.02	<0.02	0.18	<0.02	<0.1	0.04	0.02	0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW008	25/11/2022	0083_MW008_221125	Normal	EP2215920	<0.02	<0.02	0.03	<0.02	0.30	<0.02	<0.1	<0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW017	24/11/2022	0083_MW017_221124	Normal	EP2215848	0.03	0.05	1.15	0.11	12.3	<0.02	0.8	2.41	2.35	1.21	0.48	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	4.01	0.90	<0.05
MW017	24/11/2022	0083_QC128_221124	Field Duplicate	EP2215848	0.05	0.04	1.10	0.11	10.8	<0.02	0.9	2.56	2.58	1.40	0.51	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.60	0.81	<0.05
MW017	24/11/2022	0083_QC228_221124	Interlab Duplicate	945147	0.03	0.05	1.1	0.13	15	<0.01	0.80	2.4	2.4	1.2	0.42	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	3.0	0.65	<0.01
MW019	23/11/2022	0083_MW019_221123	Normal	EP2215793	<0.02	<0.02	0.07	<0.02	0.02	<0.02	<0.1	0.03	<0.02	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW027	23/11/2022	0083_MW027_221123	Normal	EP2215793	<0.02	<0.02	0.12	<0.02	0.08	<0.02	<0.1	0.03	0.03	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW027	23/11/2022	0083_QC124_221123	Field Duplicate	EP2215793	<0.02	<0.02	0.15	<0.02	0.08	<0.02	<0.1	0.05	0.04	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW027	23/11/2022	0083_QC224_221123	Interlab Duplicate	945147	0.03	<0.01	0.11	<0.01	0.06	<0.01	<0.05	0.04	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01
MW101	24/11/2022	0083_MW101_221124	Normal	EP2215848	<0.02	<0.02	0.28	<0.02	0.03	<0.02	<0.1	<0.02	0.14	0.10	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW102	24/11/2022	0083_MW102_221124	Normal	EP2215848	<0.02	<0.02	0.29	<0.02	0.19	<0.02	<0.1	<0.02	0.21	0.16	0.09	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW103	24/11/2022	0083_MW103_221124	Normal	EP2215848	0.05	0.07	0.53	<0.02	0.07	<0.02	0.3	0.96	0.72	0.19	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW104	24/11/2022	0083_MW104_5.5-6.0_221124	Normal	EP2215848	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW105	25/11/2022	0083_MW105_4.9-4.5_221125	Normal	EP2215920	<0.02	<0.02	0.02	<0.02	0.07	<0.02	<0.1	0.13	0.13	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.10	<0.05	<0.05
MW107	25/11/2022	0083_MW107_3.1-4.1_221125	Normal	EP2215976	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW109	25/11/2022	0083_MW109_6.5-7.0_221125	Normal	EP2215976	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW110	25/11/2022	0083_MW110_7.5-8.0_221125	Normal	EP2215976	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW111	25/11/2022	0083_MW111_8.5-9.0_221125	Normal	EP2215976	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW112	24/11/2022	0083_MW112_2.0-3.0_221124	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW113	24/11/2022	0083_MW113_2.5-3.5_221124	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW114	24/11/2022	0083_MW114_4.5-5.0_221124	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW115	24/11/2022	0083_MW115_2.5-3.0_221124	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW116	23/11/2022	0083_MW116_1.2-2.2_221123	Normal	EP2215818	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW117	23/11/2022	0083_MW117_2.0-2.5_221123	Normal	EP2215818	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW119	24/11/2022	0083_MW119_221124	Normal	EP2215848	0.51	0.88	6.38	0.07	0.13	<0.02	0.3	0.87	2.30	0.16	0.13	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW129	23/11/2022	0083_MW129_1.5-2.0_221123	Normal	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW130	23/11/2022	0083_MW130_1.4-1.9_221123	Normal	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW130	23/11/2022	0083_QC126_221123	Field Duplicate	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW130	23/11/2022	0083_QC226_221123	Interlab Duplicate	945147	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01
MW134	23/11/2022	0083_MW134_221123	Normal	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW202	25/11/2022	0083_MW202_221125	Normal	EP2215920	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW210	25/11/2022	0083_MW210_221125	Normal	EP2215920	<0.02	<0.02	0.02	<0.02	0.09	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW212	25/11/2022	0083_MW212_221125	Normal	EP2215920	<0.02	<0.02	0.06	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW213	23/11/2022	0083_MW213_221123	Normal	EP2215793	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW214	23/11/2022	0083_MW214_221123	Normal	EP2215793	<0.02	<0.02	0.02	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW214	23/11/2022	0083_QC127_221123	Field Duplicate	EP2215793	<0.02	<0.02	0.02	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
MW214	23/11/2022	0083_QC227_221123	Interlab Duplicate	945147	<0.01	<0.01	0.02	<0.01	0.10	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01
MW218	24/11/2022	0083_MW218_221124	Normal	EP2215848	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH101	24/11/2022	0083_OTH101_221124	Normal	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH102	25/11/2022	0083_OTH102_221125	Normal	EP2215921	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH103	25/11/2022	0083_OTH103_221125	Normal	EP2215920	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH104	24/11/2022	0083_OTH104_221124	Normal	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH105	24/11/2022	0083_OTH105_221124	Normal	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH105	24/11/2022	0083_QC129_221124	Field Duplicate	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH105	24/11/2022	0083_QC229_221124	Interlab Duplicate	945147	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01
OTH106	24/11/2022	0083_OTH106_221124	Normal	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH107	23/11/2022	0083_OTH107_221123	Normal	EP2215819	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH108	23/11/2022	0083_OTH108_221123	Normal	EP2215819	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH109	24/11/2022	0083_OTH109_221124	Normal	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH110	24/11/2022	0083_OTH110_221124	Normal	EP2215870	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
OTH113	23/11/2022	0083_OTH113_221123	Normal	EP2215816	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:
First-time detection of PFOA or PFHxS+PFOS
New exceedance of guideline value

Env Stds Comments
*Practical screening guideline of 0.01 µg/L adopted based on typical current laboratory limit of reporting (HEPA, 2020)

					PFAS - Perfluoroalkyl Sulfonamides							PFAS			Metals				Inorganics								
					Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)
					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	meq/L	mg/L	%	mg/L
LOR - Limit of Reporting					0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	1	1	1	1	0.01	0.01	1	0.01	1
PFAS NEMP 2020 Interim Marine 99%																											
PFAS NEMP 2020 Recreational Water												**2**															
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report No.**																							
MW004	**25/11/2022**	**0083_MW004_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.20	0.29	0.29	62	46	21	308	<1	207	<1	207	22.3	20.8	593	3.49	70
MW008	**25/11/2022**	**0083_MW008_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.33	0.35	0.35	298	813	290	6,000	<1	214	<1	214	304	350	9,530	7.14	1,460
MW017	**24/11/2022**	**0083_MW017_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**13.4**	25.6	25.8	276	618	272	4,930	<1	308	<1	308	263	286	8,050	4.19	1,430
MW017	**24/11/2022**	**0083_QC128_221124**	**Field Duplicate**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**11.9**	24.3	24.5	271	597	262	4,670	<1	316	<1	316	245	272	7,540	5.26	1,260
MW017	**24/11/2022**	**0083_QC228_221124**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**16.1**	27	27.25													
MW019	**23/11/2022**	**0083_MW019_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.14	0.14	408	897	352	6,790	<1	342	<1	342	346	398	10,900	7.09	1,510
MW027	**23/11/2022**	**0083_MW027_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.20	0.28	0.28	307	630	253	4,820	<1	341	<1	341	272	283	8,540	2.02	1,170
MW027	**23/11/2022**	**0083_QC124_221123**	**Field Duplicate**	**EP2215793**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.23	0.34	0.34													
MW027	**23/11/2022**	**0083_QC224_221123**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.17	0.29	0.29													
MW101	**24/11/2022**	**0083_MW101_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	0.59	0.59	176	510	202	4,000	<1	742	<1	742	222	230	6,980	1.68	508
MW102	**24/11/2022**	**0083_MW102_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.48	0.94	1.00	235	475	185	3,640	<1	298	<1	298	176	214	5,400	9.60	870
MW103	**24/11/2022**	**0083_MW103_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.60	2.85	2.92	236	448	175	3,310	<1	298	<1	298	186	197	5,640	2.94	998
MW104	**24/11/2022**	**0083_MW104_5.5-6.0_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	246	412	155	3,010	<1	378	<1	378	178	181	5,410	0.94	843
MW105	**25/11/2022**	**0083_MW105_4.9-4.5_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.47	0.47	315	831	301	6,200	<1	247	<1	247	302	361	9,450	9.02	1,450
MW107	**25/11/2022**	**0083_MW107_3.1-4.1_221125**	**Normal**	**EP2215976**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	407	1,250	506	9,740	<1	156	<1	156	498	560	16,200	5.82	1,830
MW109	**25/11/2022**	**0083_MW109_6.5-7.0_221125**	**Normal**	**EP2215976**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	257	697	292	5,520	<1	212	<1	212	281	318	8,820	6.11	1,350
MW110	**25/11/2022**	**0083_MW110_7.5-8.0_221125**	**Normal**	**EP2215976**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	246	559	254	4,740	<1	231	<1	231	240	271	7,800	5.94	766
MW111	**25/11/2022**	**0083_MW111_8.5-9.0_221125**	**Normal**	**EP2215976**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	336	965	391	7,550	<1	195	<1	195	372	434	11,800	7.68	1,720
MW112	**24/11/2022**	**0083_MW112_2.0-3.0_221124**	**Normal**	**EP2215871**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	193	427	165	3,240	<1	241	<1	241	183	190	5,680	1.88	858
MW113	**24/11/2022**	**0083_MW113_2.5-3.5_221124**	**Normal**	**EP2215871**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	265	766	309	6,020	<1	250	<1	250	311	346	9,760	5.28	1,490
MW114	**24/11/2022**	**0083_MW114_4.5-5.0_221124**	**Normal**	**EP2215871**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	482	1,480	619	11,800	<1	191	<1	191	580	675	18,400	7.52	2,770
MW115	**24/11/2022**	**0083_MW115_2.5-3.0_221124**	**Normal**	**EP2215871**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	249	715	291	5,740	<1	252	<1	252	296	328	9,160	5.13	1,580
MW116	**23/11/2022**	**0083_MW116_1.2-2.2_221123**	**Normal**	**EP2215818**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	382	1,210	492	9,480	<1	123	<1	123	477	544	15,200	6.48	2,220
MW117	**23/11/2022**	**0083_MW117_2.0-2.5_221123**	**Normal**	**EP2215818**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	431	1,270	524	9,930	<1	251	<1	251	496	571	15,700	7.06	2,310
MW119	**24/11/2022**	**0083_MW119_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**6.51**	10.8	11.7	211	519	219	3,840	<1	367	<1	367	225	226	7,010	0.10	977
MW129	**23/11/2022**	**0083_MW129_1.5-2.0_221123**	**Normal**	**EP2215820**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	502	1,360	536	10,800	<1	315	<1	315	563	620	17,900	4.83	2,500
MW130	**23/11/2022**	**0083_MW130_1.4-1.9_221123**	**Normal**	**EP2215820**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	429	1,200	491	9,200	<1	462	<1	462	463	533	14,500	6.97	2,170
MW130	**23/11/2022**	**0083_QC126_221123**	**Field Duplicate**	**EP2215820**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	424	1,180	485	9,100	<1	478	<1	478	464	526	14,500	6.27	2,200
MW130	**23/11/2022**	**0083_QC226_221123**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1													
MW134	**23/11/2022**	**0083_MW134_221123**	**Normal**	**EP2215820**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	441	981	448	8,470	<1	192	<1	192	431	483	13,700	5.61	1,970
MW202	**25/11/2022**	**0083_MW202_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	332	980	424	8,060	<1	183	<1	183	426	459	13,600	3.69	1,860
MW210	**25/11/2022**	**0083_MW210_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	0.13	0.13	40	56	15	294	<1	110	<1	110	21.2	19.8	608	3.38	87
MW212	**25/11/2022**	**0083_MW212_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06	63	119	70	1,070	<1	166	<1	166	59.2	61.3	1,740	1.68	329
MW213	**23/11/2022**	**0083_MW213_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	97	63	20	257	<1	303	<1	303	23.1	21.7	464	3.13	191
MW214	**23/11/2022**	**0083_MW214_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08	32	28	9	113	<1	151	<1	151	9.98	9.05	185	4.93	84
MW214	**23/11/2022**	**0083_QC127_221123**	**Field Duplicate**	**EP2215793**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08	32	28	9	114	<1	154	<1	154	9.96	9.09	182	4.56	84
MW214	**23/11/2022**	**0083_QC227_221123**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.12	0.12													
MW218	**24/11/2022**	**0083_MW218_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	25	45	31	364	<1	193	<1	193	23.6	21.6	571	4.49	175
OTH101	**24/11/2022**	**0083_OTH101_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	434	1,390	570	11,000	4	121	<1	124	584	629	18,800	3.75	2,440
OTH102	**25/11/2022**	**0083_OTH102_221125**	**Normal**	**EP2215921**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	447	1,350	558	10,900	<1	132	<1	132	601	622	19,500	1.72	2,310
OTH103	**25/11/2022**	**0083_OTH103_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	442	1,380	570	10,900	<1	126	<1	126	550	624	17,500	6.32	2,590
OTH104	**24/11/2022**	**0083_OTH104_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	479	1,500	619	11,800	<1	131	<1	131	564	676	18,000	9.02	2,600
OTH105	**24/11/2022**	**0083_OTH105_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	498	1,590	656	12,700	<1	136	<1	136	550	725	17,600	13.8	2,420
OTH105	**24/11/2022**	**0083_QC129_221124**	**Field Duplicate**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	455	1,450	597	11,600	<1	128	<1	128	578	662	18,600	6.74	2,450
OTH105	**24/11/2022**	**0083_QC229_221124**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1													
OTH106	**24/11/2022**	**0083_OTH106_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	477	1,550	632	12,500	<1	127	<1	127	578	711	18,600	10.3	2,440
OTH107	**23/11/2022**	**0083_OTH107_221123**	**Normal**	**EP2215819**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	449	1,390	586	10,800	<1	122	<1	122	557	622	17,800	5.44	2,540
OTH108	**23/11/2022**	**0083_OTH108_221123**	**Normal**	**EP2215819**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	465	1,440	608	11,200	<1	129	<1	129	546	644	17,400	8.28	2,520
OTH109	**24/11/2022**	**0083_OTH109_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	443	1,380	563	11,000	3	122	<1	125	560	628	17,900	5.78	2,520
OTH110	**24/11/2022**	**0083_OTH110_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	489	1,560	648	12,500	<1	122	<1	122	618	713	20,000	7.16	2,460
OTH113	**23/11/2022**	**0083_OTH113_221123**	**Normal**	**EP2215816**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	450	1,390	582	11,100	<1	122	<1	122	536	634	17,100	8.46	2,440

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:

First-time detection of PFOA or PFHxS+PFOS
New exceedance of guideline value

Env Stds Comments

*Practical screening guideline of 0.01 µg/L adopted based on typical current laboratory limit of reporting (HEPA, 2020)

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids									
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting					0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report No.**																
SD113	**23/11/2022**	**0083_SD113_221123**	**Normal**	**EP2215794**	<0.0002	<0.0002	0.0014	<0.0002	0.0053	<0.0002	<0.001	0.0138	0.0052	0.0057	0.0019	0.0023	<0.0002	<0.0002	<0.0002	<0.0002
SD120	**23/11/2022**	**0083_SD120_221123**	**Normal**	**EP2215817**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD126	**23/11/2022**	**0083_QC125_221123**	**Field Duplicate**	**EP2215817**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD126	**23/11/2022**	**0083_QC225_221123**	**Interlab Duplicate**	**945147**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD126	**23/11/2022**	**0083_SD126_221123**	**Normal**	**EP2215817**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD127	**24/11/2022**	**0083_SD127_221124**	**Normal**	**EP2215849**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD128	**24/11/2022**	**0083_SD128_221124**	**Normal**	**EP2215849**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Notes:

First-time detection of PFOA or PFHxS+PFOS

						PFAS - (n:2) Fluorotelomer Sulfonic Acids					PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting					0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report No.**															
SD113	**23/11/2022**	**0083_SD113_221123**	**Normal**	**EP2215794**	<0.0005	<0.0005	0.0070	0.0065	<0.0005	0.0004	<0.0005	<0.0002	0.0022	<0.0005	<0.0002	<0.0005	0.0067	0.0468	0.0517
SD120	**23/11/2022**	**0083_SD120_221123**	**Normal**	**EP2215817**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD126	**23/11/2022**	**0083_QC125_221123**	**Field Duplicate**	**EP2215817**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD126	**23/11/2022**	**0083_QC225_221123**	**Interlab Duplicate**	**945147**	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
SD126	**23/11/2022**	**0083_SD126_221123**	**Normal**	**EP2215817**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD127	**24/11/2022**	**0083_SD127_221124**	**Normal**	**EP2215849**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD128	**24/11/2022**	**0083_SD128_221124**	**Normal**	**EP2215849**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

Notes:

First-time detection of PFOA or PFHxS+PFOS

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS -
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.01	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.05
PFAS NEMP 2020 Interim Marine 99%					0.00023						19							
PFAS NEMP 2020 Recreational Water											**10**							
Date	**Field ID**	**Sample Type**	**Lab Report No.**															
23/11/2022	**0083_QC304_221123**	**Rinsate**	**EP2215793**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
23/11/2022	**0083_QC305_221123**	**Rinsate**	**EP2215793**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
23/11/2022	**0083_QC306_221123**	**Rinsate**	**EP2215793**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
23/11/2022	**0083_QC404_221123**	**Field Blank**	**EP2215793**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
23/11/2022	**0083_QC405_221123**	**Field Blank**	**EP2215793**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
23/11/2022	**0083_QC406_221123**	**Field Blank**	**EP2215793**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
24/11/2022	**0083_QC301_221124**	**Rinsate**	**EP2215848**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
24/11/2022	**0083_QC302_221124**	**Rinsate**	**EP2215848**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
24/11/2022	**0083_QC401_221124**	**Field Blank**	**EP2215848**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
24/11/2022	**0083_QC402_221124**	**Field Blank**	**EP2215848**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
25/11/2022	**0083_QC301_221125**	**Rinsate**	**EP2215920**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
25/11/2022	**0083_QC302_221125**	**Rinsate**	**EP2215920**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
25/11/2022	**0083_QC401_221125**	**Field Blank**	**EP2215920**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
25/11/2022	**0083_QC402_221125**	**Field Blank**	**EP2215920**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

	n:2) Fluorotelomer Sulfonic Acids			PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	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
LOR - Limit of Reporting	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%													
PFAS NEMP 2020 Recreational Water											**2**		

Date	Field ID	Sample Type	Lab Report No.												
23/11/2022	**0083_QC304_221123**	**Rinsate**	**EP2215793**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	**0083_QC305_221123**	**Rinsate**	**EP2215793**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	**0083_QC306_221123**	**Rinsate**	**EP2215793**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	**0083_QC404_221123**	**Field Blank**	**EP2215793**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	**0083_QC405_221123**	**Field Blank**	**EP2215793**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	**0083_QC406_221123**	**Field Blank**	**EP2215793**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
24/11/2022	**0083_QC301_221124**	**Rinsate**	**EP2215848**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
24/11/2022	**0083_QC302_221124**	**Rinsate**	**EP2215848**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
24/11/2022	**0083_QC401_221124**	**Field Blank**	**EP2215848**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
24/11/2022	**0083_QC402_221124**	**Field Blank**	**EP2215848**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
25/11/2022	**0083_QC301_221125**	**Rinsate**	**EP2215920**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
25/11/2022	**0083_QC302_221125**	**Rinsate**	**EP2215920**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
25/11/2022	**0083_QC401_221125**	**Field Blank**	**EP2215920**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
25/11/2022	**0083_QC402_221125**	**Field Blank**	**EP2215920**	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

		Date	23/11/2022	23/11/2022		23/11/2022	23/11/2022		23/11/2022	23/11/2022	
		Field ID	0083_MW027_221123	0083_QC124_221123		0083_MW027_221123	0083_QC224_221123		0083_MW214_221123	0083_QC127_221123	
		Matrix Type	Water	Water		Water	Water		Water	Water	
		Lab Report Number	EP2215793	EP2215793	RPD	EP2215793	945147	RPD	EP2215793	EP2215793	RPD
	Unit	LOR									
PFAS - Perfluoroalkyl Sulfonic Acids											
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	0.03	40	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.12	0.15	22	0.12	0.11	9	0.02	0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.08	0.08	0	0.08	0.06	29	0.06	0.06	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Perfluoroalkyl Carboxylic Acids											
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.03	0.05	50	0.03	0.04	29	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.03	0.04	29	0.03	0.03	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.02	0.02	0	0.02	0.02	0	<0.02	<0.02	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids											
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - Perfluoroalkyl Sulfonamides											
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS											
Sum of PFHxS and PFOS	µg/L	0.01	0.20	0.23	14	0.20	0.17	16	0.08	0.08	0
Sum of PFAS (WA DER List)	µg/L	0.01	0.28	0.34	19	0.28	0.29	4	0.08	0.08	0
Sum of PFAS	µg/L	0.01	0.28	0.34	19	0.28	0.29	4	0.08	0.08	0

**RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***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

			Date	23/11/2022	23/11/2022		23/11/2022	23/11/2022		23/11/2022	23/11/2022	
			Field ID	0083_MW214_221123	0083_QC227_221123		0083_MW130_1.4-1.9_221123	0083_QC126_221123		0083_MW130_1.4-1.9_221123	0083_QC226_221123	
			Matrix Type	Water	Water		Water	Water		Water	Water	
			Lab Report Number	EP2215793	945147	RPD	EP2215820	EP2215820	RPD	EP2215820	945147	RPD
	Unit	LOR										
PFAS - Perfluoroalkyl Sulfonic Acids												
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.02	0.02	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.06	0.10	50	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS												
Sum of PFHxS and PFOS	µg/L	0.01	0.08	0.12	40	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01	0.08	0.12	40	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01	0.08	0.12	40	<0.01	<0.01	0	<0.01	<0.1	0

			Date	24/11/2022	24/11/2022		24/11/2022	24/11/2022		24/11/2022	24/11/2022	
			Field ID	0083_MW017_221124	0083_QC128_221124		0083_MW017_221124	0083_QC228_221124		0083_OTH105_221124	0083_QC129_221124	
			Matrix Type	Water	Water		Water	Water		Water	Water	
			Lab Report Number	EP2215848	EP2215848	RPD	EP2215848	945147	RPD	EP2215870	EP2215870	RPD
	Unit	LOR										
PFAS - Perfluoroalkyl Sulfonic Acids												
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.03	0.05	50	0.03	0.03	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.05	0.04	22	0.05	0.05	0	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	1.15	1.10	4	1.15	1.1	4	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	0.11	0.11	0	0.11	0.13	17	<0.02	<0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	12.3	10.8	13	12.3	15	20	<0.01	<0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Perfluoroalkyl Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.05	0.8	0.9	12	0.8	0.80	0	<0.1	<0.1	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	2.41	2.56	6	2.41	2.4	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	2.35	2.58	9	2.35	2.4	2	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	1.21	1.40	15	1.21	1.2	1	<0.02	<0.02	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.48	0.51	6	0.48	0.42	13	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	0.04	0.04	0	0.04	0.03	29	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	0.01	0	<0.05	<0.05	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	4.01	3.60	11	4.01	3.0	**29**	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	0.90	0.81	11	0.90	0.65	**32**	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS												
Sum of PFHxS and PFOS	µg/L	0.01	13.4	11.9	12	13.4	16.1	18	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01	25.6	24.3	5	25.6	27	5	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01	25.8	24.5	5	25.8	27.25	5	<0.01	<0.01	0

			Date	24/11/2022	24/11/2022	
			Field ID	0083_OTH105_221124	0083_QC229_221124	
			Matrix Type	Water	Water	
			Lab Report Number	EP2215870	945147	RPD
	Unit	LOR				
PFAS - Perfluoroalkyl Sulfonic Acids						
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids					
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids					
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides					
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0
PFAS					
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01	<0.01	<0.1	0

			Date	23/11/2022	23/11/2022		23/11/2022	23/11/2022	
			Field ID	0083_SD126_221123	0083_QC125_221123		0083_SD126_221123	0083_QC225_221123	
			Lab Report Number	EP2215817	EP2215817	RPD	EP2215817	945147	RPD
	Unit	LOR							
PFAS - Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005					<0.005	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS									
Sum of PFHxS and PFOS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Sum of PFAS (WA DER List)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0
Sum of PFAS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.05	0

***RPDs have only been considered where a concentration is greater than 1 times the LOR.**
****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))**
*****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

C

LABORATORY CERTIFICATES

Cardno

now

Stantec

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215793

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0082 PFAS OTP **Client:** STANTEC **Project Manager:** [redacted]

ALS Compass COC Reference: 45328 **# Samples:** 45322 38226 45326 45325 45323 45327 45324

Phone: [redacted])

Sampler: [redacted]

Phone: [redacted])

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC	21		
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 45322 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW027		23/11/2022 01:34 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
002	0083_QC124		23/11/2022 01:35 PM	WATER	ALS: 4 Non ALS: 0	No		X		lab QC
003	0083_MW019		23/11/2022 01:52 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
004	0083_MW213		23/11/2022 02:17 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0083_MW214		23/11/2022 02:39 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0083_QC127		23/11/2022 02:40 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0083_QC304		23/11/2022 04:00 PM	WATER	ALS: 2 Non ALS: 0	No		X		
008	0083_QC305		23/11/2022 04:00 PM	WATER	ALS: 2 Non ALS: 0	No		X		
009	0083_QC306		23/11/2022 03:59 PM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 45322 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_QC404		23/11/2022 03:59 PM	WATER	ALS: 2 Non ALS: 0	No		X		
011	0083_QC405		23/11/2022 03:59 PM	WATER	ALS: 2 Non ALS: 0	No		X		
012	0083_QC406		23/11/2022 03:58 PM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

ALS COC#: 45322 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW027	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_MW019	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW213	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0083_MW214	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0083_QC127	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45322 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW027	Clear Plastic Bottle - Natural	500 mL	00070522145173	Green	No	
001	0083_MW027	HDPE (no PTFE)	20 mL	00350821001901	Grey	No	
001	0083_MW027	HDPE (no PTFE)	20 mL	00350821001954	Grey	No	
002	0083_QC124	HDPE (no PTFE)	20 mL	00350621000633	Grey	No	
002	0083_QC124	HDPE (no PTFE)	20 mL	00350821036759	Grey	No	
002	0083_QC124	HDPE (no PTFE)	20 mL	00350821001870	Grey	No	
002	0083_QC124	HDPE (no PTFE)	20 mL	00350821001762	Grey	No	
003	0083_MW019	HDPE (no PTFE)	20 mL	00350821001891	Grey	No	
003	0083_MW019	HDPE (no PTFE)	20 mL	00350821001904	Grey	No	
003	0083_MW019	Clear Plastic Bottle - Natural	500 mL	00070522145003	Green	No	
004	0083_MW213	Clear Plastic Bottle - Natural	500 mL	00070522144873	Green	No	
004	0083_MW213	HDPE (no PTFE)	20 mL	00350821001729	Grey	No	
004	0083_MW213	HDPE (no PTFE)	20 mL	00350821001958	Grey	No	
005	0083_MW214	HDPE (no PTFE)	20 mL	00350821001782	Grey	No	
005	0083_MW214	HDPE (no PTFE)	20 mL	00350821001777	Grey	No	
005	0083_MW214	Clear Plastic Bottle - Natural	500 mL	00070522144898	Green	No	
006	0083_QC127	HDPE (no PTFE)	20 mL	00350821001866	Grey	No	
006	0083_QC127	HDPE (no PTFE)	20 mL	00350821001835	Grey	No	
006	0083_QC127	Clear Plastic Bottle - Natural	500 mL	00070522144943	Green	No	
007	0083_QC304	HDPE (no PTFE)	20 mL	00350621035948	Grey	No	
007	0083_QC304	HDPE (no PTFE)	20 mL	00350621035926	Grey	No	
008	0083_QC305	HDPE (no PTFE)	20 mL	00350621035950	Grey	No	
008	0083_QC305	HDPE (no PTFE)	20 mL	00350821036707	Grey	No	
009	0083_QC306	HDPE (no PTFE)	20 mL	00350621035824	Grey	No	
009	0083_QC306	HDPE (no PTFE)	20 mL	00350821036373	Grey	No	
010	0083_QC404	HDPE (no PTFE)	20 mL	00350621036011	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 45322 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW027		23/11/2022 01:34 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
002	0083_QC124		23/11/2022 01:35 PM	WATER	ALS: 4 Non ALS: 0	No		X		lab QC
003	0083_MW019		23/11/2022 01:52 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
004	0083_MW213		23/11/2022 02:17 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0083_MW214		23/11/2022 02:39 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0083_QC127		23/11/2022 02:40 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0083_QC304		23/11/2022 04:00 PM	WATER	ALS: 2 Non ALS: 0	No		X		
008	0083_QC305		23/11/2022 04:00 PM	WATER	ALS: 2 Non ALS: 0	No		X		
009	0083_QC306		23/11/2022 03:59 PM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 45322 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_QC404		23/11/2022 03:59 PM	WATER	ALS: 2 Non ALS: 0	No		X		
011	0083_QC405		23/11/2022 03:59 PM	WATER	ALS: 2 Non ALS: 0	No		X		
012	0083_QC406		23/11/2022 03:58 PM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 45322 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

010	0083_QC404	HDPE (no PTFE)	20 mL	00350621000624	Grey	No	
011	0083_QC405	HDPE (no PTFE)	20 mL	00350621035834	Grey	No	
011	0083_QC405	HDPE (no PTFE)	20 mL	00350621035828	Grey	No	
012	0083_QC406	HDPE (no PTFE)	20 mL	00350821036760	Grey	No	
012	0083_QC406	HDPE (no PTFE)	20 mL	00350621035988	Grey	No	

Total Bottle Count: ALS: 31, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215793**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45322	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215793-001	23-Nov-2022 13:34	0083_MW027_221123	✓	✓	✓	✓
EP2215793-002	23-Nov-2022 13:35	0083_QC124_221123		✓		
EP2215793-003	23-Nov-2022 13:52	0083_MW019_221123	✓	✓	✓	✓
EP2215793-004	23-Nov-2022 14:17	0083_MW213_221123	✓	✓	✓	✓
EP2215793-005	23-Nov-2022 14:39	0083_MW214_221123	✓	✓	✓	✓
EP2215793-006	23-Nov-2022 14:40	0083_QC127_221123	✓	✓	✓	✓
EP2215793-007	23-Nov-2022 16:00	0083_QC304_221123		✓		
EP2215793-008	23-Nov-2022 16:00	0083_QC305_221123		✓		
EP2215793-009	23-Nov-2022 15:59	0083_QC306_221123		✓		
EP2215793-010	23-Nov-2022 15:59	0083_QC404_221123		✓		
EP2215793-011	23-Nov-2022 15:59	0083_QC405_221123		✓		
EP2215793-012	23-Nov-2022 15:58	0083_QC406_221123		✓		

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215793**	Page	: 1 of 13
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45322	Issue Date	: 08-Dec-2022 21:03
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 12		
No. of samples analysed	: 12		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW027_221123	0083_QC124_221123	0083_MW019_221123	0083_MW213_221123	0083_MW214_221123
				Sampling date / time	23-Nov-2022 13:34	23-Nov-2022 13:35	23-Nov-2022 13:52	23-Nov-2022 14:17	23-Nov-2022 14:39
Compound	CAS Number	LOR	Unit		EP2215793-001	EP2215793-002	EP2215793-003	EP2215793-004	EP2215793-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**341**	----	**342**	**303**	**151**
Total Alkalinity as CaCO3	----	1	mg/L		**341**	----	**342**	**303**	**151**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1170**	----	**1510**	**191**	**84**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**8540**	----	**10900**	**464**	**185**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**307**	----	**408**	**97**	**32**
Magnesium	7439-95-4	1	mg/L		**630**	----	**897**	**63**	**28**
Sodium	7440-23-5	1	mg/L		**4820**	----	**6790**	**257**	**113**
Potassium	7440-09-7	1	mg/L		**253**	----	**352**	**20**	**9**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**272**	----	**346**	**23.1**	**9.98**
ø Total Cations	----	0.01	meq/L		**283**	----	**398**	**21.7**	**9.05**
ø Ionic Balance	----	0.01	%		**2.02**	----	**7.09**	**3.13**	**4.93**
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	0.01	µg/L		**0.12**	**0.15**	**0.07**	**0.03**	**0.02**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.08**	**0.08**	**0.02**	<0.01	**0.06**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.03**	**0.05**	**0.03**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.03**	**0.04**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.02**	**0.02**	**0.02**	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW027_221123	0083_QC124_221123	0083_MW019_221123	0083_MW213_221123	0083_MW214_221123
				Sampling date / time	23-Nov-2022 13:34	23-Nov-2022 13:35	23-Nov-2022 13:52	23-Nov-2022 14:17	23-Nov-2022 14:39
Compound	CAS Number	LOR	Unit		EP2215793-001	EP2215793-002	EP2215793-003	EP2215793-004	EP2215793-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW027_221123	0083_QC124_221123	0083_MW019_221123	0083_MW213_221123	0083_MW214_221123
				Sampling date / time	23-Nov-2022 13:34	23-Nov-2022 13:35	23-Nov-2022 13:52	23-Nov-2022 14:17	23-Nov-2022 14:39
					EP2215793-001	EP2215793-002	EP2215793-003	EP2215793-004	EP2215793-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**0.28**	**0.34**	**0.14**	**0.03**	**0.08**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.20**	**0.23**	**0.09**	**0.03**	**0.08**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.28**	**0.34**	**0.14**	**0.03**	**0.08**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**89.8**	**82.3**	**93.1**	**90.9**	**87.2**
13C8-PFOA	----	0.02	%		**95.5**	**94.4**	**91.9**	**97.5**	**96.9**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_QC127_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215793-006	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**154**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**154**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**84**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**182**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**32**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**28**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**114**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**9**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**9.96**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**9.09**	----	----	----	----
ø Ionic Balance	----	0.01	%		**4.56**	----	----	----	----
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	0.01	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		**0.06**	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_QC127_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215793-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_QC127_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215793-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**0.08**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.08**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.08**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**83.4**	----	----	----	----
13C8-PFOA	----	0.02	%		**92.1**	----	----	----	----

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_QC304_221123	0083_QC305_221123	0083_QC306_221123	0083_QC404_221123	0083_QC405_221123
				Sampling date / time	23-Nov-2022 16:00	23-Nov-2022 16:00	23-Nov-2022 15:59	23-Nov-2022 15:59	23-Nov-2022 15:59
					EP2215793-007	EP2215793-008	EP2215793-009	EP2215793-010	EP2215793-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<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	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
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

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC304_221123	0083_QC305_221123	0083_QC306_221123	0083_QC404_221123	0083_QC405_221123
				Sampling date / time	23-Nov-2022 16:00	23-Nov-2022 16:00	23-Nov-2022 15:59	23-Nov-2022 15:59	23-Nov-2022 15:59
Compound	CAS Number	LOR	Unit		EP2215793-007	EP2215793-008	EP2215793-009	EP2215793-010	EP2215793-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.2**	**96.2**	**89.6**	**96.7**	**93.0**
13C8-PFOA	----	0.02	%		**100**	**97.3**	**91.2**	**96.9**	**89.4**

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)				Sample ID	0083_QC406_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 15:58	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215793-012	--------	--------	--------	--------
					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	0.01	µg/L		<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)				Sample ID	**0083_QC406_221123**	----	----	----	----
				Sampling date / time	23-Nov-2022 15:58	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2215793-012**	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	%		**95.5**	----	----	----	----
13C8-PFOA	----	0.02	%		**93.2**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **RINSATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215793**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45322	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 12		
No. of samples analysed	: 12		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752742)									
EP2215791-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	134	129	4.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	134	129	4.1	0% - 20%
EP2215792-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	163	162	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	163	162	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736349)									
EP2215792-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2870	3080	7.0	0% - 20%
EP2215793-004	0083_MW213_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	191	196	2.2	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736348)									
EP2215792-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	28200	26700	5.5	0% - 20%
EP2215793-004	0083_MW213_221123	ED045G: Chloride	16887-00-6	1	mg/L	464	495	6.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736104)									
EP2215792-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	584	575	1.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1750	1750	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14000	14100	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	755	756	0.2	0% - 20%
EP2215793-004	0083_MW213_221123	ED093F: Calcium	7440-70-2	1	mg/L	97	97	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	63	63	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	257	257	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743869)									
EP2215792-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215793-002	0083_QC124_221123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.15	0.18	21.8	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.08	0.07	16.3	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743869)									
EP2215792-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215793-002	0083_QC124_221123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	<0.02	90.4	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.04	0.03	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743869)									
EP2215792-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743869) - continued									
EP2215792-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215793-002	0083_QC124_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743869)									
EP2215792-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215793-002	0083_QC124_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743869)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4743869) - continued									
EP2215792-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215793-002	0083_QC124_221123	EP231X: Sum of PFAS	----	0.01	µg/L	0.34	0.30	12.5	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752742)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	87.8	118
				<1	200 mg/L	100	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736349)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	94.9	89.9	112
				<1	500 mg/L	92.0	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736348)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	88.6	113
				<1	1000 mg/L	98.6	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736104)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.3	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.9	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743869)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	84.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743869)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	96.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	95.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	101	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	123	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743869) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743869)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	94.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	107	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	98.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	101	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	104	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	86.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743869)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	101	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	91.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	88.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.8	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736349)							
EP2215792-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736348)							
EP2215792-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743869)							
EP2215792-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	91.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	104	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	98.6	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743869) - continued							
EP2215792-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	91.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	88.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743869)							
EP2215792-007	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	105	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	108	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	103	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	99.8	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	103	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	128	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	118	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743869)							
EP2215792-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	110	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	104	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	93.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.2	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	109	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743869)							
EP2215792-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	93.6	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	90.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	72.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215793**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA GW - MB	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: pfas-omp HEHA	No. of samples analysed	: 12

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	EP2215792--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	EP2215792--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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW027_221123, 0083_MW019_221123, 0083_MW213_221123, 0083_MW214_221123, 0083_QC127_221123	**23-Nov-2022**	**----**	----	----	**07-Dec-2022**	07-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW027_221123, 0083_MW019_221123, 0083_MW213_221123, 0083_MW214_221123, 0083_QC127_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW027_221123, 0083_MW019_221123, 0083_MW213_221123, 0083_MW214_221123, 0083_QC127_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW027_221123, 0083_MW019_221123, 0083_MW213_221123, 0083_MW214_221123, 0083_QC127_221123	**23-Nov-2022**	**----**	----	----	**30-Nov-2022**	30-Nov-2022	✓

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)								
0083_MW027_221123,	0083_QC124_221123,	**23-Nov-2022**	**02-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
0083_MW019_221123,	0083_MW213_221123,							
0083_MW214_221123,	0083_QC127_221123,							
0083_QC304_221123,	0083_QC305_221123,							
0083_QC306_221123,	0083_QC404_221123,							
0083_QC405_221123,	0083_QC406_221123							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW027_221123,	0083_QC124_221123,	**23-Nov-2022**	**02-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
0083_MW019_221123,	0083_MW213_221123,							
0083_MW214_221123,	0083_QC127_221123,							
0083_QC304_221123,	0083_QC305_221123,							
0083_QC306_221123,	0083_QC404_221123,							
0083_QC405_221123,	0083_QC406_221123							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0083_MW027_221123,	0083_QC124_221123,	**23-Nov-2022**	**02-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
0083_MW019_221123,	0083_MW213_221123,							
0083_MW214_221123,	0083_QC127_221123,							
0083_QC304_221123,	0083_QC305_221123,							
0083_QC306_221123,	0083_QC404_221123,							
0083_QC405_221123,	0083_QC406_221123							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW027_221123,	0083_QC124_221123,	**23-Nov-2022**	**02-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
0083_MW019_221123,	0083_MW213_221123,							
0083_MW214_221123,	0083_QC127_221123,							
0083_QC304_221123,	0083_QC305_221123,							
0083_QC306_221123,	0083_QC404_221123,							
0083_QC405_221123,	0083_QC406_221123							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0083_MW027_221123,	0083_QC124_221123,	**23-Nov-2022**	**02-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
0083_MW019_221123,	0083_MW213_221123,							
0083_MW214_221123,	0083_QC127_221123,							
0083_QC304_221123,	0083_QC305_221123,							
0083_QC306_221123,	0083_QC404_221123,							
0083_QC405_221123,	0083_QC406_221123							

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215794

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-~~0082~~ PFAS OTP **Client:** STANTEC **Project Manager:** [redacted]

Phone: ( ) [redacted]

ALS Compass COC Reference: ~~45322~~ ~~38226~~ ~~45326~~ ~~45325~~ ~~45323~~ 45328 **# Samples:** 45327 45324 **Sampler:**

Phone: ( ) [redacted]

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC	21		
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: 45324 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD113		23/11/2022 02:13 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 45324 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD113	HDPE Soil Jar	200 mL	00620322054909	Grey	No	

Total Bottle Count: ALS: 1, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215794**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45324	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215794-001	23-Nov-2022 14:13	0083_SD113_221123	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215794**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45324	Issue Date	: 07-Dec-2022 11:45
Sampler	: [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD113_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:13	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215794-001	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**6.6**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0014**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0053**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0138**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0052**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0057**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0019**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		**0.0023**	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		**0.0004**	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD113_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:13	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215794-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		**0.0022**	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		**0.0070**	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0065**	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0517**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0067**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0468**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**113**	----	----	----	----
13C8-PFOA	----	0.0002	%		**102**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215794**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45324	Issue Date	: 07-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749329)									
EP2215811-002	Anonymous	EA055: Moisture Content	----	0.1	%	14.9	15.0	0.8	0% - 20%
EP2215817-002	Anonymous	EA055: Moisture Content	----	0.1	%	12.2	12.3	0.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045) - continued									
EP2215789-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	69.2	143

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	66.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	90.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	119	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	112	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	93.2	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045) - continued							
EP2215789-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	69.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79.2	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215794**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA SD - MB	Issue Date	: 07-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 1
Order number	: pfas-omp HEHA	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / 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)							
0083_SD113_221123	**23-Nov-2022**	**----**	----	----	**06-Dec-2022**	07-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_221123	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_221123	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD113_221123	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_221123	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD113_221123	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

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

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 Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215816

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA- ~~C0062~~ PFAS OTP **Client:** STANTEC **Project Manager:** [redacted]

Phone:

ALS Compass COC Reference: 45328 45322 38226 45326 45325 45323 **# Samples:** (45327) 45324 **Sampler:** [redacted]

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 45327 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH113	2 x extra pfas QC	23/11/2022 02:57 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: 45327 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

[redacted]

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_OTH113	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 45327 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

[redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH113	HDPE (no PTFE)	20 mL	00350621067363	Grey	No	
001	0083_OTH113	HDPE (no PTFE)	20 mL	00350621067308	Grey	No	
001	0083_OTH113	HDPE (no PTFE)	20 mL	00350821043241	Grey	No	
001	0083_OTH113	HDPE (no PTFE)	20 mL	00350821023964	Grey	No	
001	0083_OTH113	Clear Plastic Bottle - Natural	500 mL	00070621089846	Green	No	

Total Bottle Count: ALS: 5, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215816**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45327	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215816-001	23-Nov-2022 14:57	0083_OTH113_221123	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215816**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45327	Issue Date	: 08-Dec-2022 20:57
Sampler	: [redacted]		
Site	: HEHA SW/OTH - SC		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH113_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:57	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215816-001	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**122**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**122**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2440**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17100**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**450**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1390**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**11100**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**582**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**536**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**634**	----	----	----	----
ø Ionic Balance	----	0.01	%		**8.46**	----	----	----	----
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	0.01	µg/L		<0.01	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH113_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:57	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215816-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH113_221123	----	----	----	----
				Sampling date / time	23-Nov-2022 14:57	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215816-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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	%		**99.5**	----	----	----	----
13C8-PFOA	----	0.02	%		**94.6**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215816**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45327	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - SC		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752744)									
EP2215816-001	0083_OTH113_221123	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2215870-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	137	4.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	137	4.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736352)									
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4930	4740	3.7	0% - 20%
EP2215815-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5120	5280	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736351)									
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	29700	29600	0.4	0% - 20%
EP2215815-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	34100	34400	0.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736105)									
EP2215813-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	469	493	5.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1530	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	12200	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	596	628	5.2	0% - 20%
EP2215815-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	970	1020	5.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2430	2440	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20600	20300	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	984	983	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	0083_OTH113_221123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743880)									
EP2215816-001	0083_OTH113_221123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880)									
EP2215816-001	0083_OTH113_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880) - continued									
EP2215816-001	0083_OTH113_221123	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	0083_OTH113_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743880)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4743880) - continued									
EP2215816-001	0083_OTH113_221123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752744)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	99.1	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.0	88.6	113
				<1	1000 mg/L	98.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736105)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	100	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	82.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	77.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)							
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)							
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	93.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.4	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880) - continued							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	97.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	103	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	121	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	123	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	99.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	120	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	94.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	97.6	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	94.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	109	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215816**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA SW/OTH - SC	Issue Date	: 08-Dec-2022
Sampler	: [redacted]	No. of samples received	: 1
Order number	: pfas-omp HEHA	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	EP2215797--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	EP2215797--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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_OTH113_221123	**23-Nov-2022**	**----**	----	----	**07-Dec-2022**	07-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_OTH113_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH113_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_OTH113_221123	**23-Nov-2022**	**----**	----	----	**30-Nov-2022**	30-Nov-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH113_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH113_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH113_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH113_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH113_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215817

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0082 PFAS OTP **Client:** STANTEC **Project Manager:** [redacted]

ALS Compass COC Reference: 45322 38226 45326 45325 45323 45328 **# Samples:** 45327 45324 **Phone:**

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: 38226 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SD - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD126		23/11/2022 01:54 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0083_QC125		23/11/2022 01:56 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0083_SD120		23/11/2022 03:53 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 38226 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SD - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD126	HDPE Soil Jar	200 mL	00620322029644	Grey	No	
002	0083_QC125	HDPE Soil Jar	200 mL	00620322054955	Grey	No	
003	0083_SD120	HDPE Soil Jar	200 mL	00620322029641	Grey	No	

Total Bottle Count: ALS: 3, Non ALS: 0

CHAIN OF CUSTODY

(ALS) COC#: 45326 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW134		23/11/2022 02:19 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_MW130_1.4-1.9	2 x extra pfas QC	23/11/2022 02:44 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
003	0083_QC126		23/11/2022 02:46 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_MW129_1.5-2.0		23/11/2022 03:34 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: **45326** *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW134	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW130_1.4-1.9	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_QC126	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW129_1.5-2.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45326 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW134	Clear Plastic Bottle - Natural	500 mL	00070522145021	Green	No	
001	0083_MW134	HDPE (no PTFE)	20 mL	00350821001936	Grey	No	
001	0083_MW134	HDPE (no PTFE)	20 mL	00350821001864	Grey	No	
002	0083_MW130_1.4-1.9	Clear Plastic Bottle - Natural	500 mL	00070522144935	Green	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350621067251	Grey	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350821001712	Grey	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350821001903	Grey	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350621066770	Grey	No	
003	0083_QC126	HDPE (no PTFE)	20 mL	00350522043006	Grey	No	
003	0083_QC126	Clear Plastic Bottle - Natural	500 mL	00070522145040	Green	No	
003	0083_QC126	HDPE (no PTFE)	20 mL	00350522043142	Grey	No	
004	0083_MW129_1.5-2.0	HDPE (no PTFE)	20 mL	00350522043009	Grey	No	
004	0083_MW129_1.5-2.0	HDPE (no PTFE)	20 mL	00350522042730	Grey	No	
004	0083_MW129_1.5-2.0	Clear Plastic Bottle - Natural	500 mL	00070522145086	Green	No	

Total Bottle Count: ALS: 14, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215817**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 38226	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215817-001	23-Nov-2022 13:54	0083_SD126_221123	✓	✓
EP2215817-002	23-Nov-2022 13:56	0083_QC125_221123	✓	✓
EP2215817-003	23-Nov-2022 15:53	0083_SD120_221123	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215817**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 38226	Issue Date	: 07-Dec-2022 11:46
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0083_SD126_221123	0083_QC125_221123	0083_SD120_221123	----	----
			Sampling date / time	23-Nov-2022 13:54	23-Nov-2022 13:56	23-Nov-2022 15:53	----	----
Compound	CAS Number	LOR	Unit	EP2215817-001	EP2215817-002	EP2215817-003	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**11.2**	**12.2**	**25.5**	**----**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	**----**	**----**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	**----**	**----**
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	**----**	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD126_221123	0083_QC125_221123	0083_SD120_221123	----	----
				Sampling date / time	23-Nov-2022 13:54	23-Nov-2022 13:56	23-Nov-2022 15:53	----	----
Compound	CAS Number	LOR	Unit		EP2215817-001	EP2215817-002	EP2215817-003	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<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	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**86.5**	**90.0**	**81.5**	----	----
13C8-PFOA	----	0.0002	%		**100**	**102**	**103**	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215817**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 38226	Issue Date	: 07-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749329)									
EP2215811-002	Anonymous	EA055: Moisture Content	----	0.1	%	14.9	15.0	0.8	0% - 20%
EP2215817-002	0083_QC125_221123	EA055: Moisture Content	----	0.1	%	12.2	12.3	0.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045) - continued									
EP2215789-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	69.2	143

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	66.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	90.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	119	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	112	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	93.2	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045) - continued							
EP2215789-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	69.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79.2	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215817**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA SD - SC	Issue Date	: 07-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 3
Order number	: pfas-omp HEHA	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / 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)								
0083_SD126_221123, 0083_SD120_221123	0083_QC125_221123,	**23-Nov-2022**	**----**	----	----	**06-Dec-2022**	07-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0083_SD126_221123, 0083_SD120_221123	0083_QC125_221123,	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0083_SD126_221123, 0083_SD120_221123	0083_QC125_221123,	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0083_SD126_221123, 0083_SD120_221123	0083_QC125_221123,	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0083_SD126_221123, 0083_SD120_221123	0083_QC125_221123,	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
0083_SD126_221123, 0083_SD120_221123	0083_QC125_221123,	**23-Nov-2022**	**05-Dec-2022**	22-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

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

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 Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2215818

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0062 PFAS OTP **Client:** STANTEC **Project Manager:** [redacted]

ALS Compass COC Reference: 45322 ~~38226~~ 45326 45325 45323 45328 **#Samples:** 45327 45324 **Phone:** [redacted])

Sampler: [redacted]

Phone: [redacted])

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 45323 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW116_1.2-2.2		23/11/2022 01:54 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0083_MW117_2.0-2.5		23/11/2022 02:38 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 45323 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW116_1.2-2.2	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW117_2.0-2.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45323 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW116_1.2-2.2	Clear Plastic Bottle - Natural	500 mL	00070522145110	Green	No	
001	0083_MW116_1.2-2.2	HDPE (no PTFE)	20 mL	00350821001953	Grey	No	
001	0083_MW116_1.2-2.2	HDPE (no PTFE)	20 mL	00350821001800	Grey	No	
001	0083_MW116_1.2-2.2	HDPE (no PTFE)	20 mL	00352005019886	Grey	No	
001	0083_MW116_1.2-2.2	HDPE (no PTFE)	20 mL	00352005007520	Grey	No	
002	0083_MW117_2.0-2.5	HDPE (no PTFE)	20 mL	00350821001937	Grey	No	
002	0083_MW117_2.0-2.5	HDPE (no PTFE)	20 mL	00350821001844	Grey	No	
002	0083_MW117_2.0-2.5	Clear Plastic Bottle - Natural	500 mL	00070522145113	Green	No	

Total Bottle Count: ALS: 8, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215818**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45323	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2215818-001 : 23-Nov-2022 13:54 : 0083_MW116_1.2-2.2_221123
EP2215818-002 : 23-Nov-2022 14:38 : 0083_MW117_2.0-2.5_221123

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	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215818-001	23-Nov-2022 13:54	0083_MW116_1.2-2.2_2...	✓	✓	✓	✓
EP2215818-002	23-Nov-2022 14:38	0083_MW117_2.0-2.5_2...	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215818**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45323	Issue Date	: 08-Dec-2022 21:01
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW116_1.2-2.2_221123	0083_MW117_2.0-2.5_221123	----	----	----
				Sampling date / time	23-Nov-2022 13:54	23-Nov-2022 14:38	----	----	----
Compound	CAS Number	LOR	Unit		EP2215818-001	EP2215818-002	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**123**	**251**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**123**	**251**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2220**	**2310**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**15200**	**15700**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**382**	**431**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1210**	**1270**	----	----	----
Sodium	7440-23-5	1	mg/L		**9480**	**9930**	----	----	----
Potassium	7440-09-7	1	mg/L		**492**	**524**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**477**	**496**	----	----	----
ø Total Cations	----	0.01	meq/L		**544**	**571**	----	----	----
ø Ionic Balance	----	0.01	%		**6.48**	**7.06**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW116_1.2-2.2_221123	0083_MW117_2.0-2.5_221123	----	----	----
				Sampling date / time	23-Nov-2022 13:54	23-Nov-2022 14:38	----	----	----
Compound	CAS Number	LOR	Unit		EP2215818-001	EP2215818-002	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW116_1.2-2.2_221123	0083_MW117_2.0-2.5_221123	----	----	----
				Sampling date / time	23-Nov-2022 13:54	23-Nov-2022 14:38	----	----	----
Compound	CAS Number	LOR	Unit		EP2215818-001	EP2215818-002	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.1**	**102**	----	----	----
13C8-PFOA	----	0.02	%		**96.6**	**100**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: **EP2215818**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45323	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752744)									
EP2215816-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2215870-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	137	4.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	137	4.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748032)									
EP2215818-001	0083_MW116_1.2-2.2_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2220	2170	2.0	0% - 20%
EP2215848-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	175	173	1.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4748031)									
EP2215818-001	0083_MW116_1.2-2.2_221123	ED045G: Chloride	16887-00-6	1	mg/L	15200	15300	0.7	0% - 20%
EP2215848-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	571	567	0.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736105)									
EP2215813-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	469	493	5.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1530	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	12200	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	596	628	5.2	0% - 20%
EP2215815-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	970	1020	5.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2430	2440	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20600	20300	1.6	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 4736105) - continued									
EP2215815-006	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	984	983	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880) - continued									
EP2215816-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880) - continued									
EP2215819-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752744)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	89.9	112
				<1	500 mg/L	107	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748031)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	88.6	113
				<1	1000 mg/L	102	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736105)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	100	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	82.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	77.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748032)							
EP2215818-001	0083_MW116_1.2-2.2_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748031)							
EP2215818-001	0083_MW116_1.2-2.2_221123	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	0083_MW116_1.2-2.2_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	93.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.4	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880) - continued							
EP2215818-001	0083_MW116_1.2-2.2_221123	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	97.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)							
EP2215818-001	0083_MW116_1.2-2.2_221123	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	103	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	121	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	123	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)							
EP2215818-001	0083_MW116_1.2-2.2_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	99.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	120	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	94.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	97.6	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	94.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	0083_MW116_1.2-2.2_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	109	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215818**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA GW - JS	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: pfas-omp HEHA	No. of samples analysed	: 2

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	EP2215818--001	0083_MW116_1.2-2.2_221123	**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	EP2215818--001	0083_MW116_1.2-2.2_221123	**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
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**----**	----	----	**07-Dec-2022**	07-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**----**	----	----	**30-Nov-2022**	30-Nov-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0083_MW116_1.2-2.2_221123,	0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW116_1.2-2.2_221123, 0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW116_1.2-2.2_221123, 0083_MW117_2.0-2.5_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215819

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0082 PFAS OTP **Client:** STANTEC **Project Manage** [redacted]

45322 38226 45326 45328 45323

ALS Compass COC Reference: 45328 **# Samples:** 45327 45324 **Phone:** ( )

Sampler:

Phone: ( )

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: 45325 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH108		23/11/2022 02:18 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0083_OTH107		23/11/2022 03:06 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 45325 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH108	HDPE (no PTFE)	20 mL	00350821001805	Grey	No	
001	0083_OTH108	HDPE (no PTFE)	20 mL	00350821001815	Grey	No	
001	0083_OTH108	Clear Plastic Bottle - Natural	500 mL	00070522145130	Green	No	
001	0083_OTH108	HDPE (no PTFE)	20 mL	00352005019852	Grey	No	
001	0083_OTH108	HDPE (no PTFE)	20 mL	00352005019567	Grey	No	
002	0083_OTH107	HDPE (no PTFE)	20 mL	00350821001685	Grey	No	
002	0083_OTH107	HDPE (no PTFE)	20 mL	00350821001918	Grey	No	
002	0083_OTH107	Clear Plastic Bottle - Natural	500 mL	00070522145151	Green	No	

Total Bottle Count: ALS: 8, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215819**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45325	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215819-001	23-Nov-2022 14:18	0083_OTH108_221123	✓	✓	✓	✓
EP2215819-002	23-Nov-2022 15:06	0083_OTH107_221123	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215819**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45325	Issue Date	: 08-Dec-2022 17:24
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH108_221123	0083_OTH107_221123	----	----	----
				Sampling date / time	23-Nov-2022 14:18	23-Nov-2022 15:06	----	----	----
Compound	CAS Number	LOR	Unit		EP2215819-001	EP2215819-002	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**129**	**122**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**129**	**122**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2520**	**2540**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17400**	**17800**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**465**	**449**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1440**	**1390**	----	----	----
Sodium	7440-23-5	1	mg/L		**11200**	**10800**	----	----	----
Potassium	7440-09-7	1	mg/L		**608**	**586**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**546**	**557**	----	----	----
ø Total Cations	----	0.01	meq/L		**644**	**622**	----	----	----
ø Ionic Balance	----	0.01	%		**8.28**	**5.44**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH108_221123	0083_OTH107_221123	----	----	----
				Sampling date / time	23-Nov-2022 14:18	23-Nov-2022 15:06	----	----	----
Compound	CAS Number	LOR	Unit		EP2215819-001	EP2215819-002	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH108_221123	0083_OTH107_221123	----	----	----
				Sampling date / time	23-Nov-2022 14:18	23-Nov-2022 15:06	----	----	----
Compound	CAS Number	LOR	Unit		EP2215819-001	EP2215819-002	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**92.7**	**99.0**	----	----	----
13C8-PFOA	----	0.02	%		**97.9**	**93.1**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: **EP2215819**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45325	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752744)									
EP2215816-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2215870-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	137	4.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	137	4.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748032)									
EP2215818-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2220	2170	2.0	0% - 20%
EP2215848-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	175	173	1.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4748031)									
EP2215818-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	15200	15300	0.7	0% - 20%
EP2215848-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	571	567	0.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736105)									
EP2215813-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	469	493	5.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1530	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	12200	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	596	628	5.2	0% - 20%
EP2215815-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	970	1020	5.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2430	2440	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20600	20300	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	984	983	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215819-001	0083_OTH108_221123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215819-001	0083_OTH108_221123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880) - continued									
EP2215816-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	0083_OTH108_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	0083_OTH108_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743880)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4743880) - continued									
EP2215816-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215819-001	0083_OTH108_221123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752744)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	89.9	112
				<1	500 mg/L	107	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748031)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	88.6	113
				<1	1000 mg/L	102	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736105)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	100	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	82.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	77.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748032)							
EP2215818-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748031)							
EP2215818-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	93.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.4	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880) - continued							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	97.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	103	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	121	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	123	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	99.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	120	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	94.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	97.6	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	94.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	109	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215819**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA SW/OTH - JS	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: pfas-omp HEHA	No. of samples analysed	: 2

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	EP2215818--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	EP2215818--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
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**----**	----	----	**07-Dec-2022**	07-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**----**	----	----	**30-Nov-2022**	30-Nov-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0083_OTH108_221123,	0083_OTH107_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH108_221123, 0083_OTH107_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH108_221123, 0083_OTH107_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215820

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-C062 PFAS OTP **Client:** STANTEC **Project Manager:** [redacted]

ALS Compass COC Reference: 45322 38226 45328 45325 45323 45328 **# Samples:** 45327 45324 45356 **Phone:** ( )

Sampler: [redacted]

Phone: ( )

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC	21		
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **45326** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW134		23/11/2022 02:19 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_MW130_1.4-1.9	2 x extra pfas QC	23/11/2022 02:44 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
003	0083_QC126		23/11/2022 02:46 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_MW129_1.5-2.0		23/11/2022 03:34 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 45326 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW134	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW130_1.4-1.9	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_QC126	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW129_1.5-2.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

Wednesday, November 23, 2022 2:02:31 PM

CHAIN OF CUSTODY

ALS COC#: 45326 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW134	Clear Plastic Bottle - Natural	500 mL	00070522145021	Green	No	
001	0083_MW134	HDPE (no PTFE)	20 mL	00350821001936	Grey	No	
001	0083_MW134	HDPE (no PTFE)	20 mL	00350821001864	Grey	No	
002	0083_MW130_1.4-1.9	Clear Plastic Bottle - Natural	500 mL	00070522144935	Green	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350621067251	Grey	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350821001712	Grey	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350821001903	Grey	No	
002	0083_MW130_1.4-1.9	HDPE (no PTFE)	20 mL	00350621066770	Grey	No	
003	0083_QC126	HDPE (no PTFE)	20 mL	00350522043006	Grey	No	
003	0083_QC126	Clear Plastic Bottle - Natural	500 mL	00070522145040	Green	No	
003	0083_QC126	HDPE (no PTFE)	20 mL	00350522043142	Grey	No	
004	0083_MW129_1.5-2.0	HDPE (no PTFE)	20 mL	00350522043009	Grey	No	
004	0083_MW129_1.5-2.0	HDPE (no PTFE)	20 mL	00350522042730	Grey	No	
004	0083_MW129_1.5-2.0	Clear Plastic Bottle - Natural	500 mL	00070522145086	Green	No	

Total Bottle Count: ALS: 14, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215820**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45326	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 21.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2215820-002 : 23-Nov-2022 14:44 : 0083_MW130_1.4-1.9_221123
EP2215820-004 : 23-Nov-2022 15:34 : 0083_MW129_1.5-2.0_221123

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	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215820-001	23-Nov-2022 14:19	0083_MW134_221123	✓	✓	✓	✓
EP2215820-002	23-Nov-2022 14:44	0083_MW130_1.4-1.9_2...	✓	✓	✓	✓
EP2215820-003	23-Nov-2022 14:46	0083_QC126_221123	✓	✓	✓	✓
EP2215820-004	23-Nov-2022 15:34	0083_MW129_1.5-2.0_2...	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215820**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45326	Issue Date	: 08-Dec-2022 17:09
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW134_221123	0083_MW130_1.4-1.9_221123	0083_QC126_221123	0083_MW129_1.5-2.0_221123	----
				Sampling date / time	23-Nov-2022 14:19	23-Nov-2022 14:44	23-Nov-2022 14:46	23-Nov-2022 15:34	----
Compound	CAS Number	LOR	Unit		EP2215820-001	EP2215820-002	EP2215820-003	EP2215820-004	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		192	462	478	315	----
Total Alkalinity as CaCO3	----	1	mg/L		192	462	478	315	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1970	2170	2200	2500	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		13700	14500	14500	17900	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		441	429	424	502	----
Magnesium	7439-95-4	1	mg/L		981	1200	1180	1360	----
Sodium	7440-23-5	1	mg/L		8470	9200	9100	10800	----
Potassium	7440-09-7	1	mg/L		448	491	485	536	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		431	463	464	563	----
ø Total Cations	----	0.01	meq/L		483	533	526	620	----
ø Ionic Balance	----	0.01	%		5.61	6.97	6.27	4.83	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW134_221123	0083_MW130_1.4-1.9_221123	0083_QC126_221123	0083_MW129_1.5-2.0_221123	----
				Sampling date / time	23-Nov-2022 14:19	23-Nov-2022 14:44	23-Nov-2022 14:46	23-Nov-2022 15:34	----
Compound	CAS Number	LOR	Unit		EP2215820-001	EP2215820-002	EP2215820-003	EP2215820-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW134_221123	0083_MW130_1.4-1.9_221123	0083_QC126_221123	0083_MW129_1.5-2.0_221123	----
				Sampling date / time	23-Nov-2022 14:19	23-Nov-2022 14:44	23-Nov-2022 14:46	23-Nov-2022 15:34	----
Compound	CAS Number	LOR	Unit		EP2215820-001	EP2215820-002	EP2215820-003	EP2215820-004	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.3**	**96.8**	**91.0**	**106**	----
13C8-PFOA	----	0.02	%		**94.7**	**93.1**	**94.3**	**99.2**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215820**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45326	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752744)									
EP2215816-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2215870-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	137	4.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	137	4.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748039)									
EP2215820-001	0083_MW134_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1970	1960	0.4	0% - 20%
EP2215870-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4748038)									
EP2215820-001	0083_MW134_221123	ED045G: Chloride	16887-00-6	1	mg/L	13700	13600	0.4	0% - 20%
EP2215870-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 4736105)									
EP2215813-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	469	493	5.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1530	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	12200	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	596	628	5.2	0% - 20%
EP2215815-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	970	1020	5.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2430	2440	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20600	20300	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	984	983	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880) - continued									
EP2215816-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743880)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4743880) - continued									
EP2215816-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752744)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	103	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.9	88.6	113
				<1	1000 mg/L	99.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736105)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	100	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	82.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	77.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)							
EP2215820-001	0083_MW134_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)							
EP2215820-001	0083_MW134_221123	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	93.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.4	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880) - continued							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	97.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	103	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	121	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	123	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	99.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	120	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	94.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	97.6	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	94.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	109	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215820**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: HEHA GW - SC	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: pfas-omp HEHA	No. of samples analysed	: 4

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	EP2215820--001	0083_MW134_221123	**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	EP2215820--001	0083_MW134_221123	**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
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW134_221123,	0083_MW130_1.4-1.9_221123,	**23-Nov-2022**	**----**	----	----	**07-Dec-2022**	07-Dec-2022	✓
0083_QC126_221123,	0083_MW129_1.5-2.0_221123							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_MW134_221123,	0083_MW130_1.4-1.9_221123,	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
0083_QC126_221123,	0083_MW129_1.5-2.0_221123							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_MW134_221123,	0083_MW130_1.4-1.9_221123,	**23-Nov-2022**	**----**	----	----	**08-Dec-2022**	21-Dec-2022	✓
0083_QC126_221123,	0083_MW129_1.5-2.0_221123							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_MW134_221123,	0083_MW130_1.4-1.9_221123,	**23-Nov-2022**	**----**	----	----	**30-Nov-2022**	30-Nov-2022	✓
0083_QC126_221123,	0083_MW129_1.5-2.0_221123							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW134_221123,	0083_MW130_1.4-1.9_221123,	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
0083_QC126_221123,	0083_MW129_1.5-2.0_221123							

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)							
0083_MW134_221123, 0083_MW130_1.4-1.9_221123, 0083_QC126_221123, 0083_MW129_1.5-2.0_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW134_221123, 0083_MW130_1.4-1.9_221123, 0083_QC126_221123, 0083_MW129_1.5-2.0_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW134_221123, 0083_MW130_1.4-1.9_221123, 0083_QC126_221123, 0083_MW129_1.5-2.0_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW134_221123, 0083_MW130_1.4-1.9_221123, 0083_QC126_221123, 0083_MW129_1.5-2.0_221123	**23-Nov-2022**	**03-Dec-2022**	22-May-2023	✓	**08-Dec-2022**	22-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
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	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2215848

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0082-PFASONP **Client:** STANTEC **Project Manage** [redacted]

ALS Compass COC Reference: ~~45337~~ 45353 45356 45352 **# Samples:** _____ **Phone:** _____

Sampler: _____

Phone: _____

Turnaround Requirements: Standard ✓ Urgent _____

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 25/11/22 7AM	Date / Time: 12pm 28/4	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 45337 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW103		24/11/2022 05:45 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
002	0083_MW102		24/11/2022 05:55 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
003	0083_MW101		24/11/2022 06:07 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8			lab QC
004	0083_MW017		24/11/2022 06:25 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0083_QC128		24/11/2022 06:25 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0083_MW119		24/11/2022 06:50 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0083_MW218		24/11/2022 07:31 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
008	0083_MW104_5.5-6.0		24/11/2022 07:48 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
009	0083_QC301		24/11/2022 10:16 AM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

ALS COC#: 45337 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_QC302		24/11/2022 10:17 AM	WATER	ALS: 2 Non ALS: 0	No		X		
011	0083_QC401		24/11/2022 10:17 AM	WATER	ALS: 2 Non ALS: 0	No		X		
012	0083_QC402		24/11/2022 10:17 AM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 45337 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW103	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW102	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_MW101	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW017	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0083_QC128	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0083_MW119	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0083_MW218	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0083_MW104_5.5-6.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45337 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW103	HDPE (no PTFE)	20 mL	00350821001830	Grey	No	
001	0083_MW103	HDPE (no PTFE)	20 mL	00350821001735	Grey	No	
001	0083_MW103	Clear Plastic Bottle - Natural	500 mL	00070522144993	Green	No	
002	0083_MW102	Clear Plastic Bottle - Natural	500 mL	00070522145154	Green	No	
002	0083_MW102	HDPE (no PTFE)	20 mL	00350821001879	Grey	No	
002	0083_MW102	HDPE (no PTFE)	20 mL	00350821001889	Grey	No	
003	0083_MW101	HDPE (no PTFE)	20 mL	00350621035964	Grey	No	
003	0083_MW101	HDPE (no PTFE)	20 mL	00350621036020	Grey	No	
003	0083_MW101	Clear Plastic Bottle - Natural	500 mL	00070522145147	Green	No	
003	0083_MW101	HDPE (no PTFE)	20 mL	00350821001970	Grey	No	
003	0083_MW101	HDPE (no PTFE)	20 mL	00350821001931	Grey	No	
004	0083_MW017	HDPE (no PTFE)	20 mL	00350821001716	Grey	No	
004	0083_MW017	HDPE (no PTFE)	20 mL	00350821001703	Grey	No	
004	0083_MW017	Clear Plastic Bottle - Natural	500 mL	00070522144998	Green	No	
005	0083_QC128	HDPE (no PTFE)	20 mL	00350821001811	Grey	No	
005	0083_QC128	Clear Plastic Bottle - Natural	500 mL	00070522144914	Green	No	
005	0083_QC128	HDPE (no PTFE)	20 mL	00350821001908	Grey	No	
006	0083_MW119	Clear Plastic Bottle - Natural	500 mL	00070522145135	Green	No	
006	0083_MW119	HDPE (no PTFE)	20 mL	00350821001911	Grey	No	
006	0083_MW119	HDPE (no PTFE)	20 mL	00350821001840	Grey	No	
007	0083_MW218	HDPE (no PTFE)	20 mL	00350821001756	Grey	No	
007	0083_MW218	Clear Plastic Bottle - Natural	500 mL	00070522144917	Green	No	
007	0083_MW218	HDPE (no PTFE)	20 mL	00350821001707	Grey	No	
008	0083_MW104_5.5-6.0	Clear Plastic Bottle - Natural	500 mL	00070522144904	Green	No	
008	0083_MW104_5.5-6.0	HDPE (no PTFE)	20 mL	00350821001768	Grey	No	
008	0083_MW104_5.5-6.0	HDPE (no PTFE)	20 mL	00350821001871	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 45337 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0083_QC301	HDPE (no PTFE)	20 mL	00350621035895	Grey	No	
009	0083_QC301	HDPE (no PTFE)	20 mL	00352101071741	Grey	No	
010	0083_QC302	HDPE (no PTFE)	20 mL	00350019165640	Grey	No	
010	0083_QC302	HDPE (no PTFE)	20 mL	00352101071105	Grey	No	
011	0083_QC401	HDPE (no PTFE)	20 mL	00350019165838	Grey	No	
011	0083_QC401	HDPE (no PTFE)	20 mL	00352101058333	Grey	No	
012	0083_QC402	HDPE (no PTFE)	20 mL	00352101071520	Grey	No	
012	0083_QC402	HDPE (no PTFE)	20 mL	00352101058133	Grey	No	

Total Bottle Count: ALS: 34, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215848**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45337	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 30-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 15.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2215848-008 : 24-Nov-2022 07:48 : 0083_MW104_5.5-6.0_221124

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	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215848-001	24-Nov-2022 05:45	0083_MW103_221124	✓	✓	✓	✓
EP2215848-002	24-Nov-2022 05:55	0083_MW102_221124	✓	✓	✓	✓
EP2215848-003	24-Nov-2022 06:07	0083_MW101_221124	✓	✓	✓	✓
EP2215848-004	24-Nov-2022 06:25	0083_MW017_221124	✓	✓	✓	✓
EP2215848-005	24-Nov-2022 06:25	0083_QC128_221124	✓	✓	✓	✓
EP2215848-006	24-Nov-2022 06:50	0083_MW119_221124	✓	✓	✓	✓
EP2215848-007	24-Nov-2022 07:31	0083_MW218_221124	✓	✓	✓	✓
EP2215848-008	24-Nov-2022 07:48	0083_MW104_5.5-6.0_2...	✓	✓	✓	✓
EP2215848-009	24-Nov-2022 10:16	0083_QC301_221124		✓		
EP2215848-010	24-Nov-2022 10:17	0083_QC302_221124		✓		
EP2215848-011	24-Nov-2022 10:17	0083_QC401_221124		✓		
EP2215848-012	24-Nov-2022 10:17	0083_QC402_221124		✓		

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215848**	Page	: 1 of 11
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45337	Issue Date	: 08-Dec-2022 17:25
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 12		
No. of samples analysed	: 12		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW103_221124	0083_MW102_221124	0083_MW101_221124	0083_MW017_221124	0083_QC128_221124
				Sampling date / time	24-Nov-2022 05:45	24-Nov-2022 05:55	24-Nov-2022 06:07	24-Nov-2022 06:25	24-Nov-2022 06:25
					EP2215848-001	EP2215848-002	EP2215848-003	EP2215848-004	EP2215848-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**298**	**298**	**742**	**308**	**316**
Total Alkalinity as CaCO3	----	1	mg/L		**298**	**298**	**742**	**308**	**316**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**998**	**870**	**508**	**1430**	**1260**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**5640**	**5400**	**6980**	**8050**	**7540**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**236**	**235**	**176**	**276**	**271**
Magnesium	7439-95-4	1	mg/L		**448**	**475**	**510**	**618**	**597**
Sodium	7440-23-5	1	mg/L		**3310**	**3640**	**4000**	**4930**	**4670**
Potassium	7440-09-7	1	mg/L		**175**	**185**	**202**	**272**	**262**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**186**	**176**	**222**	**263**	**245**
ø Total Cations	----	0.01	meq/L		**197**	**214**	**230**	**286**	**272**
ø Ionic Balance	----	0.01	%		**2.94**	**9.60**	**1.68**	**4.19**	**5.26**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.05**	<0.02	<0.02	**0.03**	**0.05**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.07**	<0.02	<0.02	**0.05**	**0.04**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		**0.53**	**0.29**	**0.28**	**1.15**	**1.10**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	**0.11**	**0.11**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.07**	**0.19**	**0.03**	**12.3**	**10.8**
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		**0.3**	<0.1	<0.1	**0.8**	**0.9**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.96**	<0.02	<0.02	**2.41**	**2.56**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.72**	**0.21**	**0.14**	**2.35**	**2.58**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.19**	**0.16**	**0.10**	**1.21**	**1.40**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW103_221124	0083_MW102_221124	0083_MW101_221124	0083_MW017_221124	0083_QC128_221124
				Sampling date / time	24-Nov-2022 05:45	24-Nov-2022 05:55	24-Nov-2022 06:07	24-Nov-2022 06:25	24-Nov-2022 06:25
					EP2215848-001	EP2215848-002	EP2215848-003	EP2215848-004	EP2215848-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.03**	**0.09**	**0.04**	**0.48**	**0.51**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	**0.06**	<0.02	**0.04**	**0.04**
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)	24448-09-7	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	**4.01**	**3.60**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	**0.90**	**0.81**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW103_221124	0083_MW102_221124	0083_MW101_221124	0083_MW017_221124	0083_QC128_221124
				Sampling date / time	24-Nov-2022 05:45	24-Nov-2022 05:55	24-Nov-2022 06:07	24-Nov-2022 06:25	24-Nov-2022 06:25
					EP2215848-001	EP2215848-002	EP2215848-003	EP2215848-004	EP2215848-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**2.92**	**1.00**	**0.59**	**25.8**	**24.5**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.60**	**0.48**	**0.31**	**13.4**	**11.9**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**2.85**	**0.94**	**0.59**	**25.6**	**24.3**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.0**	**100**	**95.8**	**100**	**102**
13C8-PFOA	----	0.02	%		**95.7**	**103**	**90.5**	**94.4**	**99.5**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW119_221124	0083_MW218_221124	0083_MW104_5.5-6.0_221124	----	----
				Sampling date / time	24-Nov-2022 06:50	24-Nov-2022 07:31	24-Nov-2022 07:48	----	----
Compound	CAS Number	LOR	Unit		EP2215848-006	EP2215848-007	EP2215848-008	--------	--------
					Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		367	193	378	----	----
Total Alkalinity as CaCO3	----	1	mg/L		367	193	378	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		977	175	843	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		7010	571	5410	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		211	25	246	----	----
Magnesium	7439-95-4	1	mg/L		519	45	412	----	----
Sodium	7440-23-5	1	mg/L		3840	364	3010	----	----
Potassium	7440-09-7	1	mg/L		219	31	155	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		225	23.6	178	----	----
ø Total Cations	----	0.01	meq/L		226	21.6	181	----	----
ø Ionic Balance	----	0.01	%		0.10	4.49	0.94	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.51	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.88	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		6.38	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.07	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.13	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		0.3	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.87	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		2.30	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW119_221124	0083_MW218_221124	0083_MW104_5.5-6.0_221124	----	----
				Sampling date / time	24-Nov-2022 06:50	24-Nov-2022 07:31	24-Nov-2022 07:48	----	----
Compound	CAS Number	LOR	Unit		EP2215848-006	EP2215848-007	EP2215848-008	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.16**	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.13**	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW119_221124	0083_MW218_221124	0083_MW104_5.5-6.0_221124	----	----
				Sampling date / time	24-Nov-2022 06:50	24-Nov-2022 07:31	24-Nov-2022 07:48	----	----
Compound	CAS Number	LOR	Unit		EP2215848-006	EP2215848-007	EP2215848-008	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**11.7**	<0.01	<0.01	**----**	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**6.51**	<0.01	<0.01	**----**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**10.8**	<0.01	<0.01	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	**91.5**	**97.0**	**----**	**----**
13C8-PFOA	----	0.02	%		**97.8**	**98.2**	**98.7**	**----**	**----**

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)				Sample ID	0083_QC301_221124	0083_QC302_221124	0083_QC401_221124	0083_QC402_221124	----
				Sampling date / time	24-Nov-2022 10:16	24-Nov-2022 10:17	24-Nov-2022 10:17	24-Nov-2022 10:17	----
Compound	CAS Number	LOR	Unit		EP2215848-009	EP2215848-010	EP2215848-011	EP2215848-012	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_221124	0083_QC302_221124	0083_QC401_221124	0083_QC402_221124	----
				Sampling date / time	24-Nov-2022 10:16	24-Nov-2022 10:17	24-Nov-2022 10:17	24-Nov-2022 10:17	----
Compound	CAS Number	LOR	Unit		EP2215848-009	EP2215848-010	EP2215848-011	EP2215848-012	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**99.7**	**97.2**	**93.9**	----
13C8-PFOA	----	0.02	%		**97.6**	**89.2**	**101**	**98.3**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **RINSATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215848**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45337	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 12		
No. of samples analysed	: 12		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4738371)									
EP2215839-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	34	34	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	34	34	0.0	0% - 20%
EP2215830-023	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	71	71	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	71	71	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748032)									
EP2215818-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2220	2170	2.0	0% - 20%
EP2215848-007	0083_MW218_221124	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	175	173	1.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4748031)									
EP2215818-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	15200	15300	0.7	0% - 20%
EP2215848-007	0083_MW218_221124	ED045G: Chloride	16887-00-6	1	mg/L	571	567	0.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738821)									
EP2215715-016	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	16	15	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	26	26	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	800	788	1.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	55	54	2.1	0% - 20%
EP2215848-008	0083_MW104_5.5-6.0_221124	ED093F: Calcium	7440-70-2	1	mg/L	246	246	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	412	413	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3010	3000	0.1	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4738821) - continued									
EP2215848-008	0083_MW104_5.5-6.0_221124	ED093F: Potassium	7440-09-7	1	mg/L	155	155	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746957)									
EP2215848-003	0083_MW101_221124	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.28	0.27	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	<0.01	110	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215870-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746957)									
EP2215848-003	0083_MW101_221124	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.14	0.13	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.10	0.09	10.1	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215870-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746957)									
EP2215848-003	0083_MW101_221124	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746957) - continued									
EP2215848-003	0083_MW101_221124	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215870-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746957)									
EP2215848-003	0083_MW101_221124	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215870-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746957) - continued									
EP2215870-002	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4746957)									
EP2215848-003	0083_MW101_221124	EP231X: Sum of PFAS	----	0.01	µg/L	0.59	0.53	10.7	0% - 20%
EP2215870-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4738371)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	87.8	118
				<1	200 mg/L	98.7	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	89.9	112
				<1	500 mg/L	107	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748031)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	88.6	113
				<1	1000 mg/L	102	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738821)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.6	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.5	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.8	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746957)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	92.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	80.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	82.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746957)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	85.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746957) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	90.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746957)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	88.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	89.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	80.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	82.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.3	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	78.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746957)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	78.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	93.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	74.0	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748032)							
EP2215818-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748031)							
EP2215818-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746957)							
EP2215870-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	102	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	105	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	106	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	96.6	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746957) - continued							
EP2215870-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	91.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746957)							
EP2215870-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	112	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	112	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	111	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	109	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	121	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	114	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	130	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	112	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746957)							
EP2215870-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.1	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	109	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	118	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	107	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	105	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746957)							
EP2215870-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	112	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	138	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215848**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA GW - MB	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: pfas-omp HEHA	No. of samples analysed	: 12

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	EP2215818--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	EP2215818--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
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW103_221124,	0083_MW102_221124,	**24-Nov-2022**	**----**	----	----	**01-Dec-2022**	08-Dec-2022	✓
0083_MW101_221124,	0083_MW017_221124,							
0083_QC128_221124,	0083_MW119_221124,							
0083_MW218_221124,	0083_MW104_5.5-6.0_221124							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_MW103_221124,	0083_MW102_221124,	**24-Nov-2022**	**----**	----	----	**08-Dec-2022**	22-Dec-2022	✓
0083_MW101_221124,	0083_MW017_221124,							
0083_QC128_221124,	0083_MW119_221124,							
0083_MW218_221124,	0083_MW104_5.5-6.0_221124							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_MW103_221124,	0083_MW102_221124,	**24-Nov-2022**	**----**	----	----	**08-Dec-2022**	22-Dec-2022	✓
0083_MW101_221124,	0083_MW017_221124,							
0083_QC128_221124,	0083_MW119_221124,							
0083_MW218_221124,	0083_MW104_5.5-6.0_221124							

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)							
0083_MW103_221124, 0083_MW102_221124, 0083_MW101_221124, 0083_MW017_221124, 0083_QC128_221124, 0083_MW119_221124, 0083_MW218_221124, 0083_MW104_5.5-6.0_221124	**24-Nov-2022**	**----**	----	----	**30-Nov-2022**	01-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW103_221124, 0083_MW102_221124, 0083_MW101_221124, 0083_MW017_221124, 0083_QC128_221124, 0083_MW119_221124, 0083_MW218_221124, 0083_MW104_5.5-6.0_221124, 0083_QC301_221124, 0083_QC302_221124, 0083_QC401_221124, 0083_QC402_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW103_221124, 0083_MW102_221124, 0083_MW101_221124, 0083_MW017_221124, 0083_QC128_221124, 0083_MW119_221124, 0083_MW218_221124, 0083_MW104_5.5-6.0_221124, 0083_QC301_221124, 0083_QC302_221124, 0083_QC401_221124, 0083_QC402_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW103_221124, 0083_MW102_221124, 0083_MW101_221124, 0083_MW017_221124, 0083_QC128_221124, 0083_MW119_221124, 0083_MW218_221124, 0083_MW104_5.5-6.0_221124, 0083_QC301_221124, 0083_QC302_221124, 0083_QC401_221124, 0083_QC402_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW103_221124, 0083_MW102_221124, 0083_MW101_221124, 0083_MW017_221124, 0083_QC128_221124, 0083_MW119_221124, 0083_MW218_221124, 0083_MW104_5.5-6.0_221124, 0083_QC301_221124, 0083_QC302_221124, 0083_QC401_221124, 0083_QC402_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓

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)							
0083_MW103_221124, 0083_MW102_221124, 0083_MW101_221124, 0083_MW017_221124, 0083_QC128_221124, 0083_MW119_221124, 0083_MW218_221124, 0083_MW104_5.5-6.0_221124, 0083_QC301_221124, 0083_QC302_221124, 0083_QC401_221124, 0083_QC402_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	19	**10.53**	**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	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	19	**10.53**	**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	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215849

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0082_PFASONP **Client:** STANTEC **Project Manage** [redacted]

45337 45353 45356

ALS Compass COC Reference: 45352 **# Samples:** **Phone:**

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 25/11/22 7AM	Date / Time: 12pm 28/4	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 45356 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

QUOTE NO: SY/139/19 B

[redacted] / ES2022MWHAUS0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD127		24/11/2022 08:19 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0083_SD128		24/11/2022 08:27 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 45356 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD127	HDPE Soil Jar	200 mL	00620322054901	Grey	No	
002	0083_SD128	HDPE Soil Jar	200 mL	00620322054865	Grey	No	

Total Bottle Count: ALS: 2, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215849**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45356	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 30-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 15.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215849-001	24-Nov-2022 08:19	0083_SD127_221124	✓	✓
EP2215849-002	24-Nov-2022 08:27	0083_SD128_221124	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215849**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45356	Issue Date	: 07-Dec-2022 11:46
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		

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, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0083_SD127_221124	0083_SD128_221124	----	----	----
			Sampling date / time	24-Nov-2022 08:19	24-Nov-2022 08:27	----	----	----
Compound	CAS Number	LOR	Unit	EP2215849-001	EP2215849-002	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**13.2**	**24.8**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD127_221124	0083_SD128_221124	----	----	----
				Sampling date / time	24-Nov-2022 08:19	24-Nov-2022 08:27	----	----	----
Compound	CAS Number	LOR	Unit		EP2215849-001	EP2215849-002	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**103**	**89.5**	----	----	----
13C8-PFOA	----	0.0002	%		**102**	**99.5**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215849**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45356	Issue Date	: 07-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		

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, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749329)									
EP2215811-002	Anonymous	EA055: Moisture Content	----	0.1	%	14.9	15.0	0.8	0% - 20%
EP2215817-002	Anonymous	EA055: Moisture Content	----	0.1	%	12.2	12.3	0.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045) - continued									
EP2215789-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	69.2	143

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	66.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	90.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	119	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	112	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	93.2	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045) - continued							
EP2215789-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	69.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79.2	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215849**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA SD - MB	Issue Date	: 07-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: pfas-omp HEHA	No. of samples analysed	: 2

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / 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)							
0083_SD127_221124, 0083_SD128_221124	**24-Nov-2022**	**----**	----	----	**06-Dec-2022**	08-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD127_221124, 0083_SD128_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD127_221124, 0083_SD128_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD127_221124, 0083_SD128_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD127_221124, 0083_SD128_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD127_221124, 0083_SD128_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	14-Jan-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

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

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 Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215870

Telephone : – 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0082_PFASONP **Client:** STANTEC **Project Manager:** [redacted]

ALS Compass COC Reference: 45337 45353 45356 45352 **# Samples:** _____ **Phone:** ( )

Sampler: _____

Phone: ( )

Turnaround Requirements: Standard √ Urgent _____

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 25/11/22 7AM	Date / Time: 12pm 28/4	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 45352 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted] QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH106		24/11/2022 08:05 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0083_OTH104	2 extra pfas bottles included for internal lab qa	24/11/2022 09:27 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
003	0083_OTH105		24/11/2022 09:55 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_QC129		24/11/2022 09:56 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0083_OTH110		24/11/2022 10:40 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0083_OTH109		24/11/2022 10:42 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0083_OTH101		24/11/2022 10:45 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: 45352 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_OTH106	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_OTH104	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_OTH105	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_QC129	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0083_OTH110	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0083_OTH109	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0083_OTH101	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 45352 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH106	Clear Plastic Bottle - Natural	500 mL	00070522145186	Green	No	
001	0083_OTH106	HDPE (no PTFE)	20 mL	00352005019671	Grey	No	
001	0083_OTH106	HDPE (no PTFE)	20 mL	00352005007535	Grey	No	
001	0083_OTH106	HDPE (no PTFE)	20 mL	00350821001793	Grey	No	
001	0083_OTH106	HDPE (no PTFE)	20 mL	00350821001750	Grey	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00352005019373	Grey	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00350821001838	Grey	No	
002	0083_OTH104	Clear Plastic Bottle - Natural	500 mL	00070522145198	Green	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00350821001771	Grey	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00352005019895	Grey	No	
003	0083_OTH105	Clear Plastic Bottle - Natural	500 mL	00070522145047	Green	No	
003	0083_OTH105	HDPE (no PTFE)	20 mL	00350522043020	Grey	No	
003	0083_OTH105	HDPE (no PTFE)	20 mL	00350522042769	Grey	No	
004	0083_QC129	Clear Plastic Bottle - Natural	500 mL	00070522162805	Green	No	
004	0083_QC129	HDPE (no PTFE)	20 mL	00350821001714	Grey	No	
004	0083_QC129	HDPE (no PTFE)	20 mL	00350821001721	Grey	No	
005	0083_OTH110	Clear Plastic Bottle - Natural	500 mL	00070522145061	Green	No	
005	0083_OTH110	HDPE (no PTFE)	20 mL	00350821001905	Grey	No	
005	0083_OTH110	HDPE (no PTFE)	20 mL	00350821001790	Grey	No	
006	0083_OTH109	Clear Plastic Bottle - Natural	500 mL	00070522145187	Green	No	
006	0083_OTH109	HDPE (no PTFE)	20 mL	00350821001946	Grey	No	
006	0083_OTH109	HDPE (no PTFE)	20 mL	00350821001893	Grey	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350821001927	Grey	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350821001836	Grey	No	
007	0083_OTH101	Clear Plastic Bottle - Natural	500 mL	00070522145071	Green	No	

CHAIN OF CUSTODY

COC#: 45352 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

Total Bottle Count: ALS: 25, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215870**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45352	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 30-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 15.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215870-001	24-Nov-2022 08:05	0083_OTH106_221124	✓	✓	✓	✓
EP2215870-002	24-Nov-2022 09:27	0083_OTH104_221124	✓	✓	✓	✓
EP2215870-003	24-Nov-2022 09:55	0083_OTH105_221124	✓	✓	✓	✓
EP2215870-004	24-Nov-2022 09:56	0083_QC129_221124	✓	✓	✓	✓
EP2215870-005	24-Nov-2022 10:40	0083_OTH110_221124	✓	✓	✓	✓
EP2215870-006	24-Nov-2022 10:42	0083_OTH109_221124	✓	✓	✓	✓
EP2215870-007	24-Nov-2022 10:45	0083_OTH101_221124	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215870**	Page	: 1 of 9
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45352	Issue Date	: 08-Dec-2022 17:42
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits for sample #1, #3, #4, #5, #7 due to analytes not quantified in this report. Major cations (ED093F) and major anions (ED041G/ED045G) have been confirmed by re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH106_221124	0083_OTH104_221124	0083_OTH105_221124	0083_QC129_221124	0083_OTH110_221124
				Sampling date / time	24-Nov-2022 08:05	24-Nov-2022 09:27	24-Nov-2022 09:55	24-Nov-2022 09:56	24-Nov-2022 10:40
					EP2215870-001	EP2215870-002	EP2215870-003	EP2215870-004	EP2215870-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**127**	**131**	**136**	**128**	**122**
Total Alkalinity as CaCO3	----	1	mg/L		**127**	**131**	**136**	**128**	**122**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2440**	**2600**	**2420**	**2450**	**2460**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18600**	**18000**	**17600**	**18600**	**20000**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**477**	**479**	**498**	**455**	**489**
Magnesium	7439-95-4	1	mg/L		**1550**	**1500**	**1590**	**1450**	**1560**
Sodium	7440-23-5	1	mg/L		**12500**	**11800**	**12700**	**11600**	**12500**
Potassium	7440-09-7	1	mg/L		**632**	**619**	**656**	**597**	**648**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**578**	**564**	**550**	**578**	**618**
ø Total Cations	----	0.01	meq/L		**711**	**676**	**725**	**662**	**713**
ø Ionic Balance	----	0.01	%		**10.3**	**9.02**	**13.8**	**6.74**	**7.16**
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	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH106_221124	0083_OTH104_221124	0083_OTH105_221124	0083_QC129_221124	0083_OTH110_221124
				Sampling date / time	24-Nov-2022 08:05	24-Nov-2022 09:27	24-Nov-2022 09:55	24-Nov-2022 09:56	24-Nov-2022 10:40
Compound	CAS Number	LOR	Unit		EP2215870-001	EP2215870-002	EP2215870-003	EP2215870-004	EP2215870-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH106_221124	0083_OTH104_221124	0083_OTH105_221124	0083_QC129_221124	0083_OTH110_221124
				Sampling date / time	24-Nov-2022 08:05	24-Nov-2022 09:27	24-Nov-2022 09:55	24-Nov-2022 09:56	24-Nov-2022 10:40
Compound	CAS Number	LOR	Unit		EP2215870-001	EP2215870-002	EP2215870-003	EP2215870-004	EP2215870-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.3**	**100**	**102**	**87.5**	**88.2**
13C8-PFOA	----	0.02	%		**97.3**	**98.7**	**98.5**	**99.4**	**97.2**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH109_221124	0083_OTH101_221124	----	----	----
				Sampling date / time	24-Nov-2022 10:42	24-Nov-2022 10:45	----	----	----
Compound	CAS Number	LOR	Unit		EP2215870-006	EP2215870-007	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		**3**	**4**	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**122**	**121**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**125**	**124**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2520**	**2440**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17900**	**18800**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**443**	**434**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1380**	**1390**	----	----	----
Sodium	7440-23-5	1	mg/L		**11000**	**11000**	----	----	----
Potassium	7440-09-7	1	mg/L		**563**	**570**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**560**	**584**	----	----	----
ø Total Cations	----	0.01	meq/L		**628**	**629**	----	----	----
ø Ionic Balance	----	0.01	%		**5.78**	**3.75**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH109_221124	0083_OTH101_221124	----	----	----
				Sampling date / time	24-Nov-2022 10:42	24-Nov-2022 10:45	----	----	----
Compound	CAS Number	LOR	Unit		EP2215870-006	EP2215870-007	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH109_221124	0083_OTH101_221124	----	----	----
				Sampling date / time	24-Nov-2022 10:42	24-Nov-2022 10:45	----	----	----
Compound	CAS Number	LOR	Unit		EP2215870-006	EP2215870-007	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.7**	**100**	----	----	----
13C8-PFOA	----	0.02	%		**104**	**98.0**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215870**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45352	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752744)									
EP2215816-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2215870-002	0083_OTH104_221124	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	137	4.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	137	4.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748039)									
EP2215820-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1970	1960	0.4	0% - 20%
EP2215870-007	0083_OTH101_221124	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2440	2420	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4748038)									
EP2215820-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	13700	13600	0.4	0% - 20%
EP2215870-007	0083_OTH101_221124	ED045G: Chloride	16887-00-6	1	mg/L	18800	17000	10.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738824)									
EP2215870-001	0083_OTH106_221124	ED093F: Calcium	7440-70-2	1	mg/L	477	396	18.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1290	18.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	10300	19.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	632	519	19.6	0% - 20%
EP2215871-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	482	488	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11900	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	619	629	1.5	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746957)									
EP2215848-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.28	0.27	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	<0.01	110	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215870-002	0083_OTH104_221124	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746957)									
EP2215848-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.14	0.13	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.10	0.09	10.1	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215870-002	0083_OTH104_221124	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746957)									
EP2215848-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746957) - continued									
EP2215848-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215870-002	0083_OTH104_221124	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746957)									
EP2215848-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215870-002	0083_OTH104_221124	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4746957)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4746957) - continued									
EP2215848-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.59	0.53	10.7	0% - 20%
EP2215870-002	0083_OTH104_221124	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752744)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	103	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.9	88.6	113
				<1	1000 mg/L	99.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746957)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	92.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	80.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	82.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746957)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	85.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746957) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	90.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746957)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	88.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	89.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	80.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	82.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.3	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	78.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746957)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	78.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	93.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	74.0	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)							
EP2215820-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)							
EP2215820-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746957)							
EP2215870-001	0083_OTH106_221124	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	102	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	105	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	106	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	96.6	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746957) - continued							
EP2215870-001	0083_OTH106_221124	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	91.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746957)							
EP2215870-001	0083_OTH106_221124	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	112	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	112	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	111	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	109	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	121	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	114	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	130	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	112	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746957)							
EP2215870-001	0083_OTH106_221124	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.1	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	109	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	118	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	107	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	105	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746957)							
EP2215870-001	0083_OTH106_221124	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	112	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	138	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215870**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA SW/OTH - JS	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 7
Order number	: pfas-omp HEHA	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2215820--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	EP2215820--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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**----**	----	----	**07-Dec-2022**	08-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**----**	----	----	**08-Dec-2022**	22-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**----**	----	----	**08-Dec-2022**	22-Dec-2022	✓

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)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**----**	----	----	**01-Dec-2022**	01-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH106_221124, 0083_OTH104_221124, 0083_OTH105_221124, 0083_QC129_221124, 0083_OTH110_221124, 0083_OTH109_221124, 0083_OTH101_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**08-Dec-2022**	23-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2215871

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0082_PFASONP **Client:** STANTEC **Project Manager:** [redacted]

45337 45353 45356

ALS Compass COC Reference: 45352 **# Samples:** _____ **Sampler:** _____

Phone: ( ) **Phone:** ( )

Turnaround Requirements: Standard √ Urgent _____

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 25/11/22 7AM	Date / Time: 12pm 28/4	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 45353 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW115_2.5-3.0		24/11/2022 08:08 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_MW112_2.0-3.0	2 extea bottles lab qa/qc	24/11/2022 08:50 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
003	0083_MW113_2.5-3.5		24/11/2022 09:26 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_MW114_4.5-5.0		24/11/2022 09:40 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 45353 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW115_2.5-3.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW112_2.0-3.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_MW113_2.5-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW114_4.5-5.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45353 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW115_2.5-3.0	Clear Plastic Bottle - Natural	500 mL	00070522145148	Green	No	
001	0083_MW115_2.5-3.0	HDPE (no PTFE)	20 mL	00350821001974	Grey	No	
001	0083_MW115_2.5-3.0	HDPE (no PTFE)	20 mL	00350821001722	Grey	No	
002	0083_MW112_2.0-3.0	HDPE (no PTFE)	20 mL	00350522042784	Grey	No	
002	0083_MW112_2.0-3.0	HDPE (no PTFE)	20 mL	00350522042746	Grey	No	
002	0083_MW112_2.0-3.0	HDPE (no PTFE)	20 mL	00350621086865	Grey	No	
002	0083_MW112_2.0-3.0	HDPE (no PTFE)	20 mL	00350621067638	Grey	No	
002	0083_MW112_2.0-3.0	Clear Plastic Bottle - Natural	500 mL	00070522145128	Green	No	
003	0083_MW113_2.5-3.5	Clear Plastic Bottle - Natural	500 mL	00070522145117	Green	No	
003	0083_MW113_2.5-3.5	HDPE (no PTFE)	20 mL	00350821001829	Grey	No	
003	0083_MW113_2.5-3.5	HDPE (no PTFE)	20 mL	00350821001717	Grey	No	
004	0083_MW114_4.5-5.0	Clear Plastic Bottle - Natural	500 mL	00070522145115	Green	No	
004	0083_MW114_4.5-5.0	HDPE (no PTFE)	20 mL	00350821001839	Grey	No	
004	0083_MW114_4.5-5.0	HDPE (no PTFE)	20 mL	00350821001843	Grey	No	

Total Bottle Count: ALS: 14, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215871**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45353	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 30-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 15.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2215871-001	: 24-Nov-2022 08:08	: 0083_MW115_2.5-3.0_221124
EP2215871-002	: 24-Nov-2022 08:50	: 0083_MW112_2.0-3.0_221124
EP2215871-003	: 24-Nov-2022 09:26	: 0083_MW113_2.5-3.5_221124
EP2215871-004	: 24-Nov-2022 09:40	: 0083_MW114_4.5-5.0_221124

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	*Sampling date / time*	*Sample ID*	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215871-001	24-Nov-2022 08:08	0083_MW115_2.5-3.0_2...	✓	✓	✓	✓
EP2215871-002	24-Nov-2022 08:50	0083_MW112_2.0-3.0_2...	✓	✓	✓	✓
EP2215871-003	24-Nov-2022 09:26	0083_MW113_2.5-3.5_2...	✓	✓	✓	✓
EP2215871-004	24-Nov-2022 09:40	0083_MW114_4.5-5.0_2...	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215871**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45353	Issue Date	: 08-Dec-2022 17:37
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW115_2.5-3.0_221124	0083_MW112_2.0-3.0_221124	0083_MW113_2.5-3.5_221124	0083_MW114_4.5-5.0_221124	----
				Sampling date / time	24-Nov-2022 08:08	24-Nov-2022 08:50	24-Nov-2022 09:26	24-Nov-2022 09:40	----
Compound	CAS Number	LOR	Unit		EP2215871-001	EP2215871-002	EP2215871-003	EP2215871-004	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		252	241	250	191	----
Total Alkalinity as CaCO3	----	1	mg/L		252	241	250	191	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1580	858	1490	2770	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		9160	5680	9760	18400	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		249	193	265	482	----
Magnesium	7439-95-4	1	mg/L		715	427	766	1480	----
Sodium	7440-23-5	1	mg/L		5740	3240	6020	11800	----
Potassium	7440-09-7	1	mg/L		291	165	309	619	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		296	183	311	580	----
ø Total Cations	----	0.01	meq/L		328	190	346	675	----
ø Ionic Balance	----	0.01	%		5.13	1.88	5.28	7.52	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW115_2.5-3.0_221124	0083_MW112_2.0-3.0_221124	0083_MW113_2.5-3.5_221124	0083_MW114_4.5-5.0_221124	----
				Sampling date / time	24-Nov-2022 08:08	24-Nov-2022 08:50	24-Nov-2022 09:26	24-Nov-2022 09:40	----
Compound	CAS Number	LOR	Unit		EP2215871-001	EP2215871-002	EP2215871-003	EP2215871-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW115_2.5-3.0_221124	0083_MW112_2.0-3.0_221124	0083_MW113_2.5-3.5_221124	0083_MW114_4.5-5.0_221124	----
				Sampling date / time	24-Nov-2022 08:08	24-Nov-2022 08:50	24-Nov-2022 09:26	24-Nov-2022 09:40	----
Compound	CAS Number	LOR	Unit		EP2215871-001	EP2215871-002	EP2215871-003	EP2215871-004	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**94.4**	**98.2**	**90.2**	**86.8**	----
13C8-PFOA	----	0.02	%		**101**	**96.5**	**97.2**	**94.2**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215871**	Page	: 1 of 12
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45353	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752744)									
EP2215816-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2215870-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	137	4.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	137	4.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748039)									
EP2215820-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1970	1960	0.4	0% - 20%
EP2215870-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2440	2420	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4748038)									
EP2215820-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	13700	13600	0.4	0% - 20%
EP2215870-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18800	17000	10.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738824)									
EP2215870-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	477	396	18.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1290	18.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	10300	19.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	632	519	19.6	0% - 20%
EP2215871-004	0083_MW114_4.5-5.0_221124	ED093F: Calcium	7440-70-2	1	mg/L	482	488	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11900	1.2	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 4738824) - continued									
EP2215871-004	0083_MW114_4.5-5.0_221124	ED093F: Potassium	7440-09-7	1	mg/L	619	629	1.5	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215812-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746956) - continued									
EP2215812-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746956) - continued									
EP2215791-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215812-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530) - continued									
EP2215921-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215812-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4747530) - continued									
EP2215921-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215812-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.03	40.0	No Limit
EP2215921-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4752744)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	103	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.9	88.6	113
				<1	1000 mg/L	99.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746956)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	77.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	110	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	76.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	72.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	81.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	70.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	77.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	69.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	97.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	98.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	104	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	101	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	93.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.7	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	85.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746956)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	78.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	89.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	123	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	71.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	79.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)							
EP2215820-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)							
EP2215820-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	98.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	97.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	95.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530) - continued							
EP2215920-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	96.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	84.4	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	84.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	112	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	112	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	108	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	122	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	111	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	105	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	114	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	112	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	133	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	114	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956) - continued							
EP2215791-004	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	114	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	87.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	102	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	96.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	113	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	92.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	95.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	125	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	121	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	75.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	83.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215871**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA GW - JS	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: pfas-omp HEHA	No. of samples analysed	: 4

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	EP2215820--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	EP2215820--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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW115_2.5-3.0_221124, 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**----**	----	----	**07-Dec-2022**	08-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW115_2.5-3.0_221124, 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**----**	----	----	**08-Dec-2022**	22-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW115_2.5-3.0_221124, 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**----**	----	----	**08-Dec-2022**	22-Dec-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW115_2.5-3.0_221124, 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**----**	----	----	**01-Dec-2022**	01-Dec-2022	✓

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) 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 0083_MW115_2.5-3.0_221124	**24-Nov-2022**	**06-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 0083_MW115_2.5-3.0_221124	**24-Nov-2022**	**06-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 0083_MW115_2.5-3.0_221124	**24-Nov-2022**	**06-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 0083_MW115_2.5-3.0_221124	**24-Nov-2022**	**06-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0083_MW112_2.0-3.0_221124, 0083_MW113_2.5-3.5_221124, 0083_MW114_4.5-5.0_221124	**24-Nov-2022**	**05-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 0083_MW115_2.5-3.0_221124	**24-Nov-2022**	**06-Dec-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	37	**10.81**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**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
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**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
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	2	37	**5.41**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2215920

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0082_PFASOTP **Client:** STANTEC **Project Manager:** [redacted]

Phone:

ALS Compass COC Reference: 45391 45392 45393 **# Samples:** **Sampler:**

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 25/11/22	Date / Time: 28/11 12pm	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 45391 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

[redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW008		25/11/2022 06:48 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
002	0083_MW004		25/11/2022 07:00 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
003	0083_MW212		25/11/2022 07:13 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8			lab QC
004	0083_MW105_4.9-4.5		25/11/2022 07:35 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0083_MW210		25/11/2022 07:41 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0083_MW202		25/11/2022 08:04 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0083_OTH103		25/11/2022 08:20 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
008	0083_QC301		25/11/2022 10:18 AM	WATER	ALS: 2 Non ALS: 0	No		X		
009	0083_QC302		25/11/2022 10:18 AM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: 45391 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_QC401		25/11/2022 10:18 AM	WATER	ALS: 2 Non ALS: 0	No		X		
011	0083_QC402		25/11/2022 10:17 AM	WATER	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 45391 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW008	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW004	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_MW212	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW105_4.9-4.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0083_MW210	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0083_MW202	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0083_OTH103	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45391 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW008	HDPE (no PTFE)	20 mL	00350821001832	Grey	No	
001	0083_MW008	Clear Plastic Bottle - Natural	500 mL	00070522145024	Green	No	
001	0083_MW008	HDPE (no PTFE)	20 mL	00350821001849	Grey	No	
002	0083_MW004	HDPE (no PTFE)	20 mL	00350821001940	Grey	No	
002	0083_MW004	Clear Plastic Bottle - Natural	500 mL	00070522144868	Green	No	
002	0083_MW004	HDPE (no PTFE)	20 mL	00350821001928	Grey	No	
003	0083_MW212	HDPE (no PTFE)	20 mL	00350821001823	Grey	No	
003	0083_MW212	Clear Plastic Bottle - Natural	500 mL	00070522144976	Green	No	
003	0083_MW212	HDPE (no PTFE)	20 mL	00350019165785	Grey	No	
003	0083_MW212	HDPE (no PTFE)	20 mL	00350019112585	Grey	No	
003	0083_MW212	HDPE (no PTFE)	20 mL	00350821001898	Grey	No	
004	0083_MW105_4.9-4.5	HDPE (no PTFE)	20 mL	00350821001724	Grey	No	
004	0083_MW105_4.9-4.5	Clear Plastic Bottle - Natural	500 mL	00070522144999	Green	No	
004	0083_MW105_4.9-4.5	HDPE (no PTFE)	20 mL	00350621000616	Grey	No	
005	0083_MW210	Clear Plastic Bottle - Natural	500 mL	00070821151294	Green	No	
005	0083_MW210	HDPE (no PTFE)	20 mL	00350621000415	Grey	No	
005	0083_MW210	HDPE (no PTFE)	20 mL	00350821000244	Grey	No	
006	0083_MW202	HDPE (no PTFE)	20 mL	00350821000450	Grey	No	
006	0083_MW202	Clear Plastic Bottle - Natural	500 mL	00070821026307	Green	No	
006	0083_MW202	Clear Plastic Bottle - Natural	500 mL	00070821219836	Green	No	
007	0083_OTH103	HDPE (no PTFE)	20 mL	00350821000369	Grey	No	
007	0083_OTH103	HDPE (no PTFE)	20 mL	00350821000451	Grey	No	
007	0083_OTH103	HDPE (no PTFE)	20 mL	00350019165738	Grey	No	
008	0083_QC301	HDPE (no PTFE)	20 mL	00350019165905	Grey	No	
008	0083_QC301	HDPE (no PTFE)	20 mL	00350019165809	Grey	No	
009	0083_QC302	HDPE (no PTFE)					

CHAIN OF CUSTODY

COC#: 45391 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0083_QC302	HDPE (no PTFE)	20 mL	00350019165812	Grey	No	
010	0083_QC401	HDPE (no PTFE)	20 mL	00350621035906	Grey	No	
010	0083_QC401	HDPE (no PTFE)	20 mL	00350621036005	Grey	No	
011	0083_QC402	HDPE (no PTFE)	20 mL	00352101071718	Grey	No	
011	0083_QC402	HDPE (no PTFE)	20 mL	00350821036657	Grey	No	

Total Bottle Count: ALS: 31, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215920**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45391	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 09-Dec-2022	Scheduled Reporting Date	: **09-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 19.9 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2215920-004 : 25-Nov-2022 07:35 : 0083_MW105_4.9-4.5_221125

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	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215920-001	25-Nov-2022 06:48	0083_MW008_221125	✓	✓	✓	✓
EP2215920-002	25-Nov-2022 07:00	0083_MW004_221125	✓	✓	✓	✓
EP2215920-003	25-Nov-2022 07:13	0083_MW212_221125	✓	✓	✓	✓
EP2215920-004	25-Nov-2022 07:35	0083_MW105_4.9-4.5_2...	✓	✓	✓	✓
EP2215920-005	25-Nov-2022 07:41	0083_MW210_221125	✓	✓	✓	✓
EP2215920-006	25-Nov-2022 08:04	0083_MW202_221125	✓	✓	✓	✓
EP2215920-007	25-Nov-2022 08:20	0083_OTH103_221125	✓	✓	✓	✓
EP2215920-008	25-Nov-2022 10:18	0083_QC301_221125		✓		
EP2215920-009	25-Nov-2022 10:18	0083_QC302_221125		✓		
EP2215920-010	25-Nov-2022 10:18	0083_QC401_221125		✓		
EP2215920-011	25-Nov-2022 10:17	0083_QC402_221125		✓		

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215920**	Page	: 1 of 11
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45391	Issue Date	: 09-Dec-2022 22:29
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 11		
No. of samples analysed	: 11		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW008_221125	0083_MW004_221125	0083_MW212_221125	0083_MW105_4.9-4.5_221125	0083_MW210_221125
				Sampling date / time	25-Nov-2022 06:48	25-Nov-2022 07:00	25-Nov-2022 07:13	25-Nov-2022 07:35	25-Nov-2022 07:41
					EP2215920-001	EP2215920-002	EP2215920-003	EP2215920-004	EP2215920-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**214**	**207**	**166**	**247**	**110**
Total Alkalinity as CaCO3	----	1	mg/L		**214**	**207**	**166**	**247**	**110**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1460**	**70**	**329**	**1450**	**87**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**9530**	**593**	**1740**	**9450**	**608**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**298**	**62**	**63**	**315**	**40**
Magnesium	7439-95-4	1	mg/L		**813**	**46**	**119**	**831**	**56**
Sodium	7440-23-5	1	mg/L		**6000**	**308**	**1070**	**6200**	**294**
Potassium	7440-09-7	1	mg/L		**290**	**21**	**70**	**301**	**15**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**304**	**22.3**	**59.2**	**302**	**21.2**
ø Total Cations	----	0.01	meq/L		**350**	**20.8**	**61.3**	**361**	**19.8**
ø Ionic Balance	----	0.01	%		**7.14**	**3.49**	**1.68**	**9.02**	**3.38**
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	0.01	µg/L		**0.03**	**0.02**	**0.06**	**0.02**	**0.02**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.30**	**0.18**	<0.01	**0.07**	**0.09**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	<0.02	**0.13**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.02**	**0.02**	<0.02	**0.13**	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW008_221125	0083_MW004_221125	0083_MW212_221125	0083_MW105_4.9-4.5_221125	0083_MW210_221125
				Sampling date / time	25-Nov-2022 06:48	25-Nov-2022 07:00	25-Nov-2022 07:13	25-Nov-2022 07:35	25-Nov-2022 07:41
Compound	CAS Number	LOR	Unit		EP2215920-001	EP2215920-002	EP2215920-003	EP2215920-004	EP2215920-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.02**	<0.02	**0.02**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	<0.01	<0.01	**0.02**
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)	24448-09-7	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	**0.10**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW008_221125	0083_MW004_221125	0083_MW212_221125	0083_MW105_4.9-4.5_221125	0083_MW210_221125
				Sampling date / time	25-Nov-2022 06:48	25-Nov-2022 07:00	25-Nov-2022 07:13	25-Nov-2022 07:35	25-Nov-2022 07:41
					EP2215920-001	EP2215920-002	EP2215920-003	EP2215920-004	EP2215920-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**0.35**	**0.29**	**0.06**	**0.47**	**0.13**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.33**	**0.20**	**0.06**	**0.09**	**0.11**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.35**	**0.29**	**0.06**	**0.47**	**0.13**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**86.2**	**92.0**	**91.7**	**100**	**91.4**
13C8-PFOA	----	0.02	%		**96.9**	**98.9**	**99.6**	**96.6**	**96.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW202_221125	0083_OTH103_221125	----	----	----
				Sampling date / time	25-Nov-2022 08:04	25-Nov-2022 08:20	----	----	----
Compound	CAS Number	LOR	Unit		EP2215920-006	EP2215920-007	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**183**	**126**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**183**	**126**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1860**	**2590**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**13600**	**17500**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**332**	**442**	----	----	----
Magnesium	7439-95-4	1	mg/L		**980**	**1380**	----	----	----
Sodium	7440-23-5	1	mg/L		**8060**	**10900**	----	----	----
Potassium	7440-09-7	1	mg/L		**424**	**570**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**426**	**550**	----	----	----
ø Total Cations	----	0.01	meq/L		**459**	**624**	----	----	----
ø Ionic Balance	----	0.01	%		**3.69**	**6.32**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW202_221125	0083_OTH103_221125	----	----	----
				Sampling date / time	25-Nov-2022 08:04	25-Nov-2022 08:20	----	----	----
Compound	CAS Number	LOR	Unit		EP2215920-006	EP2215920-007	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW202_221125	0083_OTH103_221125	----	----	----
				Sampling date / time	25-Nov-2022 08:04	25-Nov-2022 08:20	----	----	----
Compound	CAS Number	LOR	Unit		EP2215920-006	EP2215920-007	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.8**	**82.9**	----	----	----
13C8-PFOA	----	0.02	%		**103**	**98.1**	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_221125	0083_QC302_221125	0083_QC401_221125	0083_QC402_221125	----
				Sampling date / time	25-Nov-2022 10:18	25-Nov-2022 10:18	25-Nov-2022 10:18	25-Nov-2022 10:17	----
Compound	CAS Number	LOR	Unit		EP2215920-008	EP2215920-009	EP2215920-010	EP2215920-011	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_221125	0083_QC302_221125	0083_QC401_221125	0083_QC402_221125	----
				Sampling date / time	25-Nov-2022 10:18	25-Nov-2022 10:18	25-Nov-2022 10:18	25-Nov-2022 10:17	----
Compound	CAS Number	LOR	Unit		EP2215920-008	EP2215920-009	EP2215920-010	EP2215920-011	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.8**	**95.4**	**86.4**	**96.7**	----
13C8-PFOA	----	0.02	%		**108**	**100**	**96.1**	**102**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **RINSATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215920**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45391	Issue Date	: 09-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 11		
No. of samples analysed	: 11		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4755771)									
EP2215920-002	0083_MW004_221125	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	207	207	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	207	207	0.0	0% - 20%
EP2216081-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	3	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	3	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736352)									
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4930	4740	3.7	0% - 20%
EP2215815-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5120	5280	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736351)									
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	29700	29600	0.4	0% - 20%
EP2215815-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	34100	34400	0.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738824)									
EP2215870-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	477	396	18.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1290	18.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	10300	19.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	632	519	19.6	0% - 20%
EP2215871-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	482	488	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11900	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	619	629	1.5	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530) - continued									
ES2243219-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4747530)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4747530) - continued									
ES2243219-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.03	40.0	No Limit
EP2215921-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4755771)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	107	87.8	118
				<1	200 mg/L	94.2	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	99.1	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.0	88.6	113
				<1	1000 mg/L	98.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	72.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	81.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	70.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	77.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	69.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	85.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	71.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	79.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)							
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)							
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	0083_MW212_221125	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	96.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	84.4	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530) - continued							
EP2215920-003	0083_MW212_221125	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	84.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)							
EP2215920-003	0083_MW212_221125	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	105	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	114	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	112	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	133	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)							
EP2215920-003	0083_MW212_221125	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	102	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	96.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	113	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	92.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	0083_MW212_221125	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	121	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	75.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	83.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215920**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA GW - MB	Issue Date	: 09-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 11
Order number	: pfas-omp HEHA	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	EP2215797--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	EP2215797--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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125	**25-Nov-2022**	**----**	----	----	**09-Dec-2022**	09-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	23-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	23-Dec-2022	✓

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)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125	**25-Nov-2022**	**----**	----	----	**01-Dec-2022**	02-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125, 0083_QC301_221125, 0083_QC302_221125, 0083_QC401_221125, 0083_QC402_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125, 0083_QC301_221125, 0083_QC302_221125, 0083_QC401_221125, 0083_QC402_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125, 0083_QC301_221125, 0083_QC302_221125, 0083_QC401_221125, 0083_QC402_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125, 0083_QC301_221125, 0083_QC302_221125, 0083_QC401_221125, 0083_QC402_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓

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)							
0083_MW008_221125, 0083_MW004_221125, 0083_MW212_221125, 0083_MW105_4.9-4.5_221125, 0083_MW210_221125, 0083_MW202_221125, 0083_OTH103_221125, 0083_QC301_221125, 0083_QC302_221125, 0083_QC401_221125, 0083_QC402_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2215921

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_00382_PEARSONP **Client:** STANTEC **Project Manager:** [redacted]

45391 45392

ALS Compass COC Reference: 45393 **# Samples:** _____ **Sampler:** _____

Phone: _____

Turnaround Requirements: Standard ✓ Urgent _____

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 25/11/22	Date / Time: 28/11 12pm	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 45393 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH102	2 x extra lab QC	25/11/2022 07:03 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: 45393 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted] QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_OTH102	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45393 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH102	Clear Plastic Bottle - Natural	500 mL	00070522144940	Green	No	
001	0083_OTH102	HDPE (no PTFE)	20 mL	00350522042863	Grey	No	
001	0083_OTH102	HDPE (no PTFE)	20 mL	00350522042998	Grey	No	
001	0083_OTH102	HDPE (no PTFE)	20 mL	00350621066955	Grey	No	
001	0083_OTH102	HDPE (no PTFE)	20 mL	00350621066980	Grey	No	

Total Bottle Count: ALS: 5, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215921**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45393	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 29-Nov-2022
Client Requested Due Date	: 09-Dec-2022	Scheduled Reporting Date	: **09-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 19.9 - Ice present
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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215921-001	25-Nov-2022 07:03	0083_OTH102_221125	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215921**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45393	Issue Date	: 12-Dec-2022 11:01
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - SC		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH102_221125	----	----	----	----
				Sampling date / time	25-Nov-2022 07:03	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215921-001	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**132**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**132**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2310**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**19500**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**447**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1350**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**10900**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**558**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**601**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**622**	----	----	----	----
ø Ionic Balance	----	0.01	%		**1.72**	----	----	----	----
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	0.01	µg/L		<0.01	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH102_221125	----	----	----	----
				Sampling date / time	25-Nov-2022 07:03	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215921-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH102_221125	----	----	----	----
				Sampling date / time	25-Nov-2022 07:03	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2215921-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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	%		**82.9**	----	----	----	----
13C8-PFOA	----	0.02	%		**100**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215921**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45393	Issue Date	: 12-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4755771)									
EP2215920-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	207	207	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	207	207	0.0	0% - 20%
EP2216081-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	3	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	3	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736352)									
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4930	4740	3.7	0% - 20%
EP2215815-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5120	5280	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736351)									
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	29700	29600	0.4	0% - 20%
EP2215815-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	34100	34400	0.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738824)									
EP2215870-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	477	396	18.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1290	18.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	10300	19.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	632	519	19.6	0% - 20%
EP2215871-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	482	488	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11900	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	619	629	1.5	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215921-001	0083_OTH102_221125	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215921-001	0083_OTH102_221125	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530) - continued									
ES2243219-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	0083_OTH102_221125	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	0083_OTH102_221125	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4747530)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4747530) - continued									
ES2243219-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.03	40.0	No Limit
EP2215921-001	0083_OTH102_221125	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4755771)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	107	87.8	118
				<1	200 mg/L	94.2	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	99.1	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.0	88.6	113
				<1	1000 mg/L	98.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	72.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	81.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	70.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	77.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	69.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	85.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	71.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	79.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)							
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)							
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	96.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	84.4	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530) - continued							
EP2215920-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	84.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	105	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	114	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	112	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	133	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	102	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	96.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	113	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	92.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	121	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	75.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	83.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215921**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA SW/OTH - SC	Issue Date	: 12-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 1
Order number	: pfas-omp HEHA	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	EP2215797--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	EP2215797--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*
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_OTH102_221125	**25-Nov-2022**	**----**	----	----	**09-Dec-2022**	09-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_OTH102_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	23-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH102_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	23-Dec-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_OTH102_221125	**25-Nov-2022**	**----**	----	----	**01-Dec-2022**	02-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH102_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH102_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH102_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH102_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH102_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2215976

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0082_PEARSONP **Client:** STANTEC **Project Manager** [redacted]

45391 45392

ALS Compass COC Reference: ~~45393~~ **# Samples:** _____ **Sampler:** [redacted]

Phone: [redacted]

Turnaround Requirements: Standard ✓ Urgent _____

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 25/11/22	Date / Time: 28/11 12pm	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 45392 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW107_3.1-4.1	2 x extra lab QC	25/11/2022 06:52 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0083_MW111_8.5-9.0		25/11/2022 07:28 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0083_MW109_6.5-7.0		25/11/2022 07:38 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_MW110_7.5-8.0		25/11/2022 07:38 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 45392 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW107_3.1-4.1	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0083_MW111_8.5-9.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0083_MW109_6.5-7.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0083_MW110_7.5-8.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 45392 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW107_3.1-4.1	Clear Plastic Bottle - Natural	500 mL	00070522144883	Green	No	
001	0083_MW107_3.1-4.1	HDPE (no PTFE)	20 mL	00350522042792	Grey	No	
001	0083_MW107_3.1-4.1	HDPE (no PTFE)	20 mL	00350522043033	Grey	No	
001	0083_MW107_3.1-4.1	HDPE (no PTFE)	20 mL	00350621067136	Grey	No	
002	0083_MW111_8.5-9.0	HDPE (no PTFE)	20 mL	00350621066948	Grey	No	
002	0083_MW111_8.5-9.0	Clear Plastic Bottle - Natural	500 mL	00350821001744	Grey	No	
002	0083_MW111_8.5-9.0	HDPE (no PTFE)	20 mL	00070522145102	Green	No	
003	0083_MW109_6.5-7.0	Clear Plastic Bottle - Natural	500 mL	00350821001699	Grey	No	
003	0083_MW109_6.5-7.0	HDPE (no PTFE)	20 mL	00070522145005	Green	No	
003	0083_MW109_6.5-7.0	HDPE (no PTFE)	20 mL	00350522042925	Grey	No	
004	0083_MW110_7.5-8.0	HDPE (no PTFE)	20 mL	00350522042909	Grey	No	
004	0083_MW110_7.5-8.0	HDPE (no PTFE)	20 mL	00350522043184	Grey	No	
004	0083_MW110_7.5-8.0	Clear Plastic Bottle - Natural	500 mL	00350522042955	Grey	No	
				00070522145017	Green	No	

Total Bottle Count: ALS: 14, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2215976**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: rebecca.owen@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 45392	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Nov-2022 12:00	Issue Date	: 30-Nov-2022
Client Requested Due Date	: 08-Dec-2022	Scheduled Reporting Date	: **08-Dec-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 19.9 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2215976-001	: 25-Nov-2022 06:52	: 0083_MW107_3.1-4.1_221125
EP2215976-002	: 25-Nov-2022 07:28	: 0083_MW111_8.5-9.0_221125
EP2215976-003	: 25-Nov-2022 07:38	: 0083_MW109_6.5-7.0_221125
EP2215976-004	: 25-Nov-2022 07:38	: 0083_MW110_7.5-8.0_221125

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	*Sampling date / time*	*Sample ID*	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215976-001	25-Nov-2022 06:52	0083_MW107_3.1-4.1_2...	✓	✓	✓	✓
EP2215976-002	25-Nov-2022 07:28	0083_MW111_8.5-9.0_2...	✓	✓	✓	✓
EP2215976-003	25-Nov-2022 07:38	0083_MW109_6.5-7.0_2...	✓	✓	✓	✓
EP2215976-004	25-Nov-2022 07:38	0083_MW110_7.5-8.0_2...	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]stantec.com

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted] **(STANTEC)**
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2215976**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022 12:00
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45392	Issue Date	: 08-Dec-2022 18:04
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW107_3.1-4.1_221125	0083_MW111_8.5-9.0_221125	0083_MW109_6.5-7.0_221125	0083_MW110_7.5-8.0_221125	----
				Sampling date / time	25-Nov-2022 06:52	25-Nov-2022 07:28	25-Nov-2022 07:38	25-Nov-2022 07:38	----
Compound	CAS Number	LOR	Unit		EP2215976-001	EP2215976-002	EP2215976-003	EP2215976-004	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		156	195	212	231	----
Total Alkalinity as CaCO3	----	1	mg/L		156	195	212	231	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1830	1720	1350	766	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		16200	11800	8820	7800	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		407	336	257	246	----
Magnesium	7439-95-4	1	mg/L		1250	965	697	559	----
Sodium	7440-23-5	1	mg/L		9740	7550	5520	4740	----
Potassium	7440-09-7	1	mg/L		506	391	292	254	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		498	372	281	240	----
ø Total Cations	----	0.01	meq/L		560	434	318	271	----
ø Ionic Balance	----	0.01	%		5.82	7.68	6.11	5.94	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW107_3.1-4.1_221125	0083_MW111_8.5-9.0_221125	0083_MW109_6.5-7.0_221125	0083_MW110_7.5-8.0_221125	----
				Sampling date / time	25-Nov-2022 06:52	25-Nov-2022 07:28	25-Nov-2022 07:38	25-Nov-2022 07:38	----
Compound	CAS Number	LOR	Unit		EP2215976-001	EP2215976-002	EP2215976-003	EP2215976-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW107_3.1-4.1_221125	0083_MW111_8.5-9.0_221125	0083_MW109_6.5-7.0_221125	0083_MW110_7.5-8.0_221125	----
				Sampling date / time	25-Nov-2022 06:52	25-Nov-2022 07:28	25-Nov-2022 07:38	25-Nov-2022 07:38	----
Compound	CAS Number	LOR	Unit		EP2215976-001	EP2215976-002	EP2215976-003	EP2215976-004	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.4**	**86.6**	**91.6**	**96.5**	----
13C8-PFOA	----	0.02	%		**102**	**94.8**	**98.3**	**102**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2215976**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Contact	: REBECCA OWEN
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 01-Dec-2022
C-O-C number	: 45392	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4754931)									
EP2216123-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	234	232	1.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	234	232	1.2	0% - 20%
EP2216123-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	154	150	2.7	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	210	216	2.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	365	366	0.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4748039)									
EP2215820-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1970	1960	0.4	0% - 20%
EP2215870-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2440	2420	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4748038)									
EP2215820-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	13700	13600	0.4	0% - 20%
EP2215870-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18800	17000	10.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738824)									
EP2215870-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	477	396	18.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1290	18.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	10300	19.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	632	519	19.6	0% - 20%
EP2215871-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	482	488	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11900	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	619	629	1.5	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 4738825)									
EP2215976-002	0083_MW111_8.5-9.0_221125	ED093F: Calcium	7440-70-2	1	mg/L	336	338	0.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	965	971	0.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7550	7560	0.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	391	394	1.0	0% - 20%
EP2216119-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	13	12	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	62	62	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4747530) - continued									
EP2215921-001	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215921-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4747530) - continued									
EP2215921-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4747530)									
ES2243219-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.03	40.0	No Limit
EP2215921-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4754931)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	87.8	118
				<1	200 mg/L	98.1	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	103	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.9	88.6	113
				<1	1000 mg/L	99.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.2	84.6	108
ED093F: Dissolved Major Cations (QCLot: 4738825)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.5	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	72.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	81.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	70.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	77.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	69.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.4	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	85.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	71.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	79.4	71.4	144

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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4748039)							
EP2215820-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4748038)							
EP2215820-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	96.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	84.4	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	84.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	105	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	114	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	112	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	133	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	102	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	96.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	113	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	92.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4747530)							
EP2215920-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	121	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	75.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	83.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2215976**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted] (STANTEC)	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 28-Nov-2022
Site	: HEHA GW - SC	Issue Date	: 08-Dec-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: pfas-omp HEHA	No. of samples analysed	: 4

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	EP2215820--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	EP2215820--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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	09-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	23-Dec-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**----**	----	----	**08-Dec-2022**	23-Dec-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**----**	----	----	**01-Dec-2022**	02-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓

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)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW107_3.1-4.1_221125, 0083_MW111_8.5-9.0_221125, 0083_MW109_6.5-7.0_221125, 0083_MW110_7.5-8.0_221125	**25-Nov-2022**	**06-Dec-2022**	24-May-2023	✓	**07-Dec-2022**	24-May-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	18	**11.11**	**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	4	35	**11.43**	**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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	18	**11.11**	**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	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

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CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Stantec Australia

Office Address : 226 Adelaide Tce, Perth, WA, 6000

[redacted]

Purchase Order : PFAS-OMP 304700525

PROJECT Number : WA_0082_PFASOMP

PROJECT Name : WA_0082_PFASOMP

COC Number : AS-OMP 304700525 -01

Eurofins | mgt quote ID : NA

Data output format: PDF; ESDAT

[redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0083_QC224_221123	23/11/2022	Water	X
2	0083_QC225_221123	23/11/2022	Soil	X
3	0083_QC226_221123	23/11/2022	Water	X
4	0083_QC227_221123	23/11/2022	Water	X
5	0083_QC228_221124	24/11/2022	Water	X
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

Analytes

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

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

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

Sample comments:

Relinquished By:
Stantec

Date & Time : 24/06/2022

Signature:

Laboratory Staff

Received By: JW 20.3°C

Date & Time: 28/11/22 10:25

Signature:

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐

STANDARD ☑ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal

Courier Consignment # : 00903KBJ52

Temperature on arrival:

Report number: 945147

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Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (WA)
Contact name:	[redacted]
Project name:	WA_0082_PFASOMP
Project ID:	WA_0082_PFASOMP
Turnaround time:	5 Day
Date/Time received	Nov 28, 2022 10:25 AM
Eurofins reference	945147

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.
N/A	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

We have received an extra sample: 0083_QC229_221124. Please advise.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Harvey on phone : or by email: AndrewHarvey@eurofins.com

Results will be delivered electronically via email to [redacted] - [redacted]stantec.com.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (WA) email address.

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0082_PFASOMP
Project ID: WA_0082_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945147
Phone: 0458 839 200
Fax:

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	0083_QC224_221123	Nov 23, 2022		Water	L22-No0066738	X
2	0083_QC225_221123	Nov 23, 2022		Water	L22-No0066739	X
3	0083_QC226_221123	Nov 23, 2022		Water	L22-No0066740	X
4	0083_QC227_221123	Nov 23, 2022		Water	L22-No0066741	X
5	0083_QC228_221124	Nov 24, 2022		Water	L22-No0066742	X
6	0083_QC229_221124	Nov 24, 2022		Water	L22-No0066743	X
Test Counts						6

Stantec Australia Pty Limited
6F 226,Adelaide Terrace
Perth
WA 6000

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: [redacted]

Report **945147-S**
Project name WA_0082_PFASOMP
Project ID WA_0082_PFASOMP
Received Date Nov 28, 2022

Client Sample ID			**0083_QC225_221123**
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-No0066739**
Date Sampled			**Nov 23, 2022**
Test/Reference	LOR	Unit	
% Moisture	1	%	16
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)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	21
13C5-PFPeA (surr.)	1	%	35
13C5-PFHxA (surr.)	1	%	52
13C4-PFHpA (surr.)	1	%	39
13C8-PFOA (surr.)	1	%	48
13C5-PFNA (surr.)	1	%	63
13C6-PFDA (surr.)	1	%	71
13C2-PFUnDA (surr.)	1	%	70
13C2-PFDoDA (surr.)	1	%	62
13C2-PFTeDA (surr.)	1	%	75
Perfluoroalkyl sulfonamido substances			
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

Client Sample ID			0083_QC225_221123
Sample Matrix			Soil
Eurofins Sample No.			L22-No0066739
Date Sampled			Nov 23, 2022
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
13C8-FOSA (surr.)	1	%	88
D3-N-MeFOSA (surr.)	1	%	95
D5-N-EtFOSA (surr.)	1	%	112
D7-N-MeFOSE (surr.)	1	%	66
D9-N-EtFOSE (surr.)	1	%	70
D5-N-EtFOSAA (surr.)	1	%	67
D3-N-MeFOSAA (surr.)	1	%	58
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	65
18O2-PFHxS (surr.)	1	%	66
13C8-PFOS (surr.)	1	%	89
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	33
13C2-6:2 FTSA (surr.)	1	%	43
13C2-8:2 FTSA (surr.)	1	%	76
13C2-10:2 FTSA (surr.)	1	%	121
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 DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

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

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
% Moisture	Melbourne	Nov 28, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Nov 28, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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WA 6000

Project Name: WA_0082_PFASOMP
Project ID: WA_0082_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945147
Phone: 0458 839 200
Fax:

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	0083_QC224_221123	Nov 23, 2022		Water	L22-No0066738	X
2	0083_QC225_221123	Nov 23, 2022		Water	L22-No0066739	X
3	0083_QC226_221123	Nov 23, 2022		Water	L22-No0066740	X
4	0083_QC227_221123	Nov 23, 2022		Water	L22-No0066741	X
5	0083_QC228_221124	Nov 24, 2022		Water	L22-No0066742	X
6	0083_QC229_221124	Nov 24, 2022		Water	L22-No0066743	X
Test Counts						6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
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.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. 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	
Perfluorooctanoic 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 (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane 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-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	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	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	77			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	77			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	71			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	76			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	72			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	75			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	82			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	84			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	87			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	76			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	82			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	86			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	78			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	75			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	88			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	81			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	124			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	79			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	72			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	90			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	76			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	69			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	67			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	68			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	71			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	61			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	78			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	84			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	82			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	74			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M22-No0072521	NCP	%	88			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M22-No0072521	NCP	%	88			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M22-No0072521	NCP	%	83			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M22-No0072521	NCP	%	92			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M22-No0072521	NCP	%	85			50-150	Pass	
Perfluorononanoic acid (PFNA)	M22-No0072521	NCP	%	86			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M22-No0072521	NCP	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M22-No0072521	NCP	%	96			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M22-No0072521	NCP	%	95			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M22-No0072521	NCP	%	90			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M22-No0072521	NCP	%	91			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M22-No0072521	NCP	%	89			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M22-No0072521	NCP	%	87			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M22-No0072521	NCP	%	84			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M22-No0072521	NCP	%	93			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M22-No0072521	NCP	%	90			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M22-No0072521	NCP	%	83			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M22-No0072521	NCP	%	92			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M22-No0072521	NCP	%	78			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M22-No0072521	NCP	%	110			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M22-No0072521	NCP	%	85			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M22-No0072521	NCP	%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-No0072521	NCP	%	83			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M22-No0072521	NCP	%	75			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-No0072521	NCP	%	86			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M22-No0072521	NCP	%	74			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M22-No0072521	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-No0072521	NCP	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M22-No0072521	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M22-No0072521	NCP	%	83			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B22-No0066704	NCP	%	23	24	6.4	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L22-No0066739	CP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L22-No0066739	CP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L22-No0066739	CP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L22-No0066739	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L22-No0066739	CP	ug/kg	< 5	< 5	<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	N/A
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.
N15	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:

Andrew Harvey	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS
Priya Kumar	Senior Analyst-Sample Properties

Kim Rodgers
Business Unit 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

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NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
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Attention: [redacted]

Report **945147-W-V3**
Project name WA_0082_PFASOMP
Project ID WA_0082_PFASOMP
Received Date Nov 28, 2022

Client Sample ID			**0083_QC224_221123**	**0083_QC226_221123**	**0083_QC227_221123**	**0083_QC228_221124**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**L22-No0066738**	**L22-No0066740**	**L22-No0066741**	**L22-No0066742**
Date Sampled			**Nov 23, 2022**	**Nov 23, 2022**	**Nov 23, 2022**	**Nov 24, 2022**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	0.80
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	[N09]0.04	< 0.01	< 0.01	[N09]2.4
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	[N09]0.03	[N09]< 0.01	< 0.01	[N09]2.4
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	[N09]0.02	< 0.01	< 0.01	[N09]1.2
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	[N09]< 0.01	< 0.01	[N09]0.42
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	[G01]< 0.01	< 0.01	0.03
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	[G01]< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	54	59	84	57
13C5-PFPeA (surr.)	1	%	50	76	82	55
13C5-PFHxA (surr.)	1	%	74	80	90	60
13C4-PFHpA (surr.)	1	%	69	75	97	59
13C8-PFOA (surr.)	1	%	81	86	102	88
13C5-PFNA (surr.)	1	%	93	77	103	97
13C6-PFDA (surr.)	1	%	82	75	89	79
13C2-PFUnDA (surr.)	1	%	77	80	75	104
13C2-PFDoDA (surr.)	1	%	64	76	66	91
13C2-PFTeDA (surr.)	1	%	44	74	74	77
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	83	108	18	113
D3-N-MeFOSA (surr.)	1	%	33	99	117	131

Client Sample ID			0083_QC224_221123	0083_QC226_221123	0083_QC227_221123	0083_QC228_221124
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22-No0066738	L22-No0066740	L22-No0066741	L22-No0066742
Date Sampled			Nov 23, 2022	Nov 23, 2022	Nov 23, 2022	Nov 24, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	27	108	20	135
D7-N-MeFOSE (surr.)	1	%	29	62	10	65
D9-N-EtFOSE (surr.)	1	%	34	60	51	64
D5-N-EtFOSAA (surr.)	1	%	104	74	26	101
D3-N-MeFOSAA (surr.)	1	%	105	68	11	102
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	0.03	< 0.01	< 0.01	0.03
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	[R16]< 0.01	< 0.01	0.02
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	[N09]0.05
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]0.11	< 0.01	[N09]0.02	[N09]1.1
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	[N09]0.13
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.06	[N09]< 0.01	[N09]0.10	[G01]15
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	[R16]< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	149	93	91	88
18O2-PFHxS (surr.)	1	%	85	83	90	78
13C8-PFOS (surr.)	1	%	111	106	103	51
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	3.0
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.65
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	178	50	83	94
13C2-6:2 FTSA (surr.)	1	%	154	51	98	103
13C2-8:2 FTSA (surr.)	1	%	140	85	74	94
13C2-10:2 FTSA (surr.)	1	%	68	72	16	92
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	0.17	< 0.01	0.12	16.1
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.06	< 0.01	0.1	15.42
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.17	< 0.01	0.12	16.52
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.29	< 0.05	0.12	27
Sum of PFASs (n=30)*	0.1	ug/L	0.29	< 0.1	0.12	27.25

Client Sample ID			0083_QC229_221124
Sample Matrix			Water
Eurofins Sample No.			L22-No0066743
Date Sampled			Nov 24, 2022
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	[N09]< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	[N09]< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	[G01]< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	[G01]< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	50
13C5-PFPeA (surr.)	1	%	81
13C5-PFHxA (surr.)	1	%	81
13C4-PFHpA (surr.)	1	%	76
13C8-PFOA (surr.)	1	%	89
13C5-PFNA (surr.)	1	%	70
13C6-PFDA (surr.)	1	%	56
13C2-PFUnDA (surr.)	1	%	47
13C2-PFDoDA (surr.)	1	%	49
13C2-PFTeDA (surr.)	1	%	41
Perfluoroalkyl sulfonamido substances			
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	%	84
D3-N-MeFOSA (surr.)	1	%	88
D5-N-EtFOSA (surr.)	1	%	80
D7-N-MeFOSE (surr.)	1	%	84
D9-N-EtFOSE (surr.)	1	%	107
D5-N-EtFOSAA (surr.)	1	%	79
D3-N-MeFOSAA (surr.)	1	%	52
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	[R16]< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	[R16]< 0.01

Client Sample ID			0083_QC229_221124
Sample Matrix			Water
Eurofins Sample No.			L22-No0066743
Date Sampled			Nov 24, 2022
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFSAs)			
13C3-PFBS (surr.)	1	%	96
18O2-PFHxS (surr.)	1	%	88
13C8-PFOS (surr.)	1	%	88
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	97
13C2-6:2 FTSA (surr.)	1	%	74
13C2-8:2 FTSA (surr.)	1	%	62
13C2-10:2 FTSA (surr.)	1	%	110
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

Sample History

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

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 Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Nov 28, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

Repeat Samples

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Dec 13, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Nov 28, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Address: 6F 226,Adelaide Terrace
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WA 6000

Project Name: WA_0082_PFASOMP
Project ID: WA_0082_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945147
Phone: 0458 839 200
Fax:

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	0083_QC224_221123	Nov 23, 2022		Water	L22-No0066738	X
2	0083_QC225_221123	Nov 23, 2022		Water	L22-No0066739	X
3	0083_QC226_221123	Nov 23, 2022		Water	L22-No0066740	X
4	0083_QC227_221123	Nov 23, 2022		Water	L22-No0066741	X
5	0083_QC228_221124	Nov 24, 2022		Water	L22-No0066742	X
6	0083_QC229_221124	Nov 24, 2022		Water	L22-No0066743	X
Test Counts						6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
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.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	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							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	78			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	80			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	86			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	73			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	77			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	99			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	91			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	92			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	92			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	83			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	84			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	75			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	99			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	68			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	91			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	80			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	85			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	75			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	72			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	86			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	73			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	71			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	84			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	84			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	59			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	82			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	67			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	72			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	73			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M22-No0071689	NCP	%	88			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M22-No0071689	NCP	%	81			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M22-No0071689	NCP	%	89			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M22-No0071689	NCP	%	77			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M22-No0071689	NCP	%	80			50-150	Pass	
Perfluorononanoic acid (PFNA)	M22-No0071689	NCP	%	73			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M22-No0071689	NCP	%	78			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M22-No0071689	NCP	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M22-No0071689	NCP	%	103			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M22-No0071689	NCP	%	139			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M22-No0071689	NCP	%	101			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M22-No0071689	NCP	%	82			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M22-No0071689	NCP	%	95			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M22-No0071689	NCP	%	105			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M22-No0071689	NCP	%	90			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M22-No0071689	NCP	%	108			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M22-No0071689	NCP	%	84			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M22-No0071689	NCP	%	85			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorononanesulfonic acid (PFNS)	M22-No0071689	NCP	%	64			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M22-No0071689	NCP	%	61			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M22-No0071689	NCP	%	97			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-No0071689	NCP	%	84			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M22-No0071689	NCP	%	86			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-No0071689	NCP	%	83			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M22-No0071689	NCP	%	48			50-150	Fail	Q08
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M22-No0071689	NCP	%	77			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M22-No0071689	NCP	%	84			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M22-No0071689	NCP	%	79			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)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

v3 report issued with updated results for samples 22-No0066740, 22-No0066742 and 22-No0066743 upon reanalysis at client request.

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	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
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.
N15	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).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
R16	The LORs have been raised due to the high concentration of one or more analytes

Authorised by:

Andrew Harvey	Analytical Services Manager
Carroll Lee	Senior Analyst-PFAS
Joseph Edouard	Senior Analyst-PFAS

Kim Rodgers
Business Unit 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

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APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

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D1 - Groundwater Field Records

Monitoring Date	Monitoring Location	Sample_ID	Screen Interval	Bore Type	TOC (mAHD)	Well Depth (m)	SWL (mbTOC)	RWL (mAHD)	Observations	Sampling Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour ?	Odour	Colour
25/11/2022	MW004	0083_MW004_221125	1.5-4.5_	Single Level	2.989	4.5	2.6	0.389		HydraSleeve	26	0.82	3245	2114	7.78	-277.5		no		Clear
25/11/2022	MW008	0083_MW008_221125	2.5-5.5_	Single Level	2.846	5.5	2.5	0.346	Gatic lid destroyed	HydraSleeve	26.9	1.1	26358	17123	7.54	-181.7		no		Clear
24/11/2022	MW017	0083_MW017_221124	3-6_	Single Level	3.421	6.0	3.39	0.031		HydraSleeve	25.5	1.45	26380	17058	7.39	-150.7	QC128/228	no		Cloudy
23/11/2022	MW019	0083_MW019_221123	1.5-4.5_	Single Level	2.955	4.5	2.87	0.085		HydraSleeve	27.2	0.58	43255	28116	7.36	-148.1		no		Cloudy
23/11/2022	MW027	0083_MW027_221123	3-6_	Single Level	4.499	6.0	4.39	0.109		HydraSleeve	29.2	0.49	27138	17634	7.44	-122	QC124/224	no		Clear
24/11/2022	MW101	0083_MW101_221124	2-4.5_	Single Level	2.4356	4.5	2.39	0.046		HydraSleeve	26.4	0.62	20773	13504	7.28	-308.9		no		Cloudy
24/11/2022	MW102	0083_MW102_221124	1-6_	Single Level	2.6924	6.0	2.605	0.087		HydraSleeve	26.8	0.93	13879	9022	7.52	-176		no		Cloudy
24/11/2022	MW103	0083_MW103_221124	1-6_	Single Level	2.7898	6.0	2.655	0.135		HydraSleeve	26.6	0.82	17872	11634	7.47	-167		no		Cloudy
24/11/2022	MW104	0083_MW104_5.5-6.0_221124	5.5-6_	Multi level	3.9903	6.0	3.94	0.05		Peristaltic Pump	27.2	1.11	18296	11909	7.57	-320.8		no		Cloudy
25/11/2022	MW105	0083_MW105_4.0-4.5_221125	4-4.5_	Multi level	3.1082	4.5	2.8	0.308		Peristaltic Pump	27.3	2.54	30075	19554	7.48	-81.8		no		Clear
25/11/2022	MW107	0083_MW107_5.5-6.0_221125	5.5-6_	Multi level	4.7014	6	4.22	0.481		Peristaltic Pump	24.6	4.98	49127	31960	7.5	-110.7		no		Cloudy
25/11/2022	MW109	0083_MW109_6.5-7.0_221125	6.5-7_	Multi level	7.0426	7	6.6	0.443		Peristaltic Pump	25.8	6.43	28479	18511	7.92	-106		no		Cloudy
25/11/2022	MW110	0083_MW110_7.5-8.0_221125	7.5-8_	Multi level	8.2665	8	7.285	0.982		Peristaltic Pump	27	4.38	18569	12060	7.8	-108.1		no		Cloudy
25/11/2022	MW111	0083_MW111_8.5-9.0_221125	8.5-9_	Multi level	8.8159	9	8.36	0.456		Peristaltic Pump	25.3	3.93	38870	25266	7.82	-105.2		no		Cloudy
24/11/2022	MW112	0083_MW112_2.0-3.0_221124	2-3_	Multi level	3.0835	3	2.63	0.4535		Peristaltic Pump	28.4	2.4	17625	11462	7.8	-100		no		Cloudy
24/11/2022	MW113	0083_MW113_2.5-3.5_221124	2.5-3.5_	Multi level	2.97	3.5	2.51	0.46		Peristaltic Pump	28.6	3.72	27940	18169	7.9	-98		yes	Slightly saline	Cloudy,Black
24/11/2022	MW114	0083_MW114_4.5-5.0_221124	4.5-5_	Multi level	2.9516	5	2.53	0.422	Shallow well blocked at 2.27 mbTOC	Peristaltic Pump	29.2	1.09	54877	35676	7.78	-108.6		no		Cloudy,Black
24/11/2022	MW115	0083_MW115_2.3-2.8_221124	2.3-2.8	Multi level	2.6281	3.0	2.09	0.538		Peristaltic Pump	29.2	2.43	29217	18993	7.72	-107.5		no		Brown
23/11/2022	MW116	0083_MW116_1.2-2.2_221123	1.2-2.2_	Multi level	2.3875	2.2	1.76	0.628		Peristaltic Pump	23.6	2.88	46024	29913	8.19	41.5		no		Clear
23/11/2022	MW117	0083_MW117_2.0-2.5_221123	2-2.5_	Multi level	2.591	2.5	1.85	0.741		Peristaltic Pump	31.7	3.15	42888	27893	8.72	106.6		no		Clear
24/11/2022	MW119	0083_MW119_221124	2.1-5.1_	Single Level	3.5069	5.1	3.32	0.187		HydraSleeve	26.3	1.48	25201	16357	7.69	-205.4		no		Clear
23/11/2022	MW129	0083_MW129_1.5-2.0_221123	1.5-2_	Multi level	2.0256	2	1.74	0.286		Peristaltic Pump	27.1	2.31	52746	34293	7.4	-104.4		no		Black,Cloudy
23/11/2022	MW130	0083_MW130_1.4-1.9_221123	1.4-1.9_	Multi level	2.016	1.9	1.71	0.306	QC126, QC226	Peristaltic Pump	26.6	3.57	44185	28725	7.35	-84	QC126, QC226	no		Cloudy
23/11/2022	MW134	0083_MW134_221123	6.5-12.5_	Single Level	10.0786	12.5	9.9	0.179		HydraSleeve	27.5	1.44	42669	27737	7.42	-96.9		no		Cloudy
25/11/2022	MW202	0083_MW202_221125	6.9-9.9_	Single Level	8.069	NA	7.03	1.039		HydraSleeve	26.8	2.75	24792	16127	7.53	-206.6		no		Clear
25/11/2022	MW210	0083_MW210_221125	1.5-4_	Single Level	2.863	4.0	2.49	0.373		HydraSleeve	26.1	2.67	1912	1235	8.49	-136.8		no		Clear
25/11/2022	MW212	0083_MW212_221125	1-4_	Single Level	3.513	4.0	3.14	0.373		HydraSleeve	26.3	2.67	1858	1208	8.34	-138.4		no		Clear
23/11/2022	MW213	0083_MW213_221123	2.5-5.5_	Single Level	4.49	5.5	4.43	0.06		HandBailing	27.7	1.6	2849	1850	8.02	-125.4		no		Clear
23/11/2022	MW214	0083_MW214_221123	2.5-5.5_	Single Level	4.29	5.5	4.2	0.09		HydraSleeve	29	1.85	1124	731	8.42	-88.4	QC127/227	no		Clear
24/11/2022	MW217		1.2-4.5_	Single Level	3.658	4.5			Dry											Clear
24/11/2022	MW218	0083_MW218_221124	2.8-5.8_	Single Level	5.137	5.8	4.9	0.237		HydraSleeve	25.5	4.31	4774	3106	8.29					Clear

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D2 - Seepage water Field Records

Monitoring Date	Monitoring Location	Sample_ID	Sampling Depth (m)	Observations	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour Comments	Colour
25/11/2022	OTH002			Saltwater dishcharge point not flowing. No sample taken									
24/11/2022	OTH101	0083_OTH101_221124	0.5		27.9	5.41	54249	35262	8.29	-125.4			Clear
25/11/2022	OTH102	0083_OTH102_221125	0.3		26.1	4.55	53199	34585	8.21	-105.4			Clear
25/11/2022	OTH103	0083_OTH103_221125	0.5		24.6	3.36	53424	34723	8.16	-60.9			Clear
24/11/2022	OTH104	0083_OTH104_221124	0.5		26.2	4.4	53857	35013	8.18	-98.1		Slightly saline	Cloudy
24/11/2022	OTH105	0083_OTH105_221124	0.6	QC129, QC229	27.8	4.29	54438	35397	8.16	-90.4	QC129, QC229		Clear
24/11/2022	OTH106	0083_OTH106_221124	0.5		26.4	4.18	54824	35646	8.17	-100.2			Clear
23/11/2022	OTH107	0083_OTH107_221123	0.5	pH probe on YSI stopped working. No reading taken.	29.9	2.88	54184	35230		86.8			Clear
23/11/2022	OTH108	0083_OTH108_221123	0.5		30.6	3.07	53689	34970	8.69	29.9			Clear
24/11/2022	OTH109	0083_OTH109_221124	0.5		27.2	5.59	53358	34687	8.28	-100.5			Clear
24/11/2022	OTH110	0083_OTH110_221124	0.5		28.1	5.84	53921	35046	8.24	-108.4			Clear
23/11/2022	OTH113	0083_OTH113_221123	0.3		31.1	4.3	53369	34690	8.38	-94.8			Clear

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D3 - Surface water Field Records

Monitoring Location	Date	Sample Depth (m)	WaterBody Depth (m)	Comments	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
SW112	23/11/2022			Access denied - Asbestos Hazard								
SW113	23/11/2022			Dry								
SW120	23/11/2022			DRY								
SW126	23/11/2022			DRY								
SW127	24/11/2022			Dry								
SW128	24/11/2022			Dry								

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D4 - Sediment Field Records

Monitoring	Date	Sample ID	Depth of	Sampling Method	Sample Condition	Sample Description	Comments
SD112	23/11/2022						Access denied - Asbestos hazard
SD113	23/11/2022	0083_SD113_221123	0.1	Shovel_Trowel	Dry	Black gravely sand	Collected from rentention drain
SD120	23/11/2022	0083_SD120_221123	0.1	Direct_into_Bottle	Dry	Grey Sand	
SD126	23/11/2022	0083_SD126_221123	0.1	Direct_into_Bottle	Dry	Grey fine grained Sand, slightyly moist under surface	QC125, QC225
SD127	24/11/2022	0083_SD127_221124	0.1	Shovel_Trowel	Dry	Grey clayey sand	
SD128	24/11/2022	0083_SD128_221124	0.1	Shovel_Trowel	Dry	Grey clayey sand, coarse	

Date of Bump Test	Site ID	Unit Brand/ Model	Ambient Air Oxygen Calibration	Zero % Oxygen Solution Calibration	Standard Concentrations	Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?	Comment	Test by (Name)	(Signature)
[redacted]											
23/11/22	0960_ Learmonth 0083_HCHA	YSI # 22F100114	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y/N pH 7.00 Y/N EC: 1,413µS/cm 35,000 Y/N	24.8	pH 4.00: 4.02 pH 7.00: 7.06 Temp: EC: 35,089	pH 4.00: (± pH 0.2) Y/N pH 7.00: (± pH 0.2) Y/N EC: (± 150µS/cm) Y/N	nil.	[redacted]	[redacted]
23/11/22	0960_ Learmonth 0083_HCHA	YSI # 21D10229	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y/N pH 7.00 Y/N EC: 1,413µS/cm 35,000 Y/N	27.2	pH 4.00: 4.03 pH 7.00: 7.03 Temp: EC: 35,115	pH 4.00: (± pH 0.2) Y/N pH 7.00: (± pH 0.2) Y/N EC: (± 150µS/cm) Y/N	nil.	[redacted]	[redacted]
23/11/22	0960_ Learmonth 0083_HCHA	YSI # 20D00054	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y/N pH 7.00 Y/N EC: 1,413µS/cm 35,000 Y/N	29.4	pH 4.00: [illegible] pH 7.00: [illegible] Temp: EC: 34,939	pH 4.00: (± pH 0.2) Y/N pH 7.00: (± pH 0.2) Y/N EC: (± 150µS/cm) Y/N	pH probe failed. [illegible]	[redacted]	
24/11/22	0083_HCHA	YSI # 22F100114	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y/N pH 7.00 Y/N EC: 1,413µS/cm 35,000 Y/N	30.5	pH 4.00: 4.17 pH 7.00: 7.19 Temp: EC: 35,018	pH 4.00: (± pH 0.2) Y/N pH 7.00: (± pH 0.2) Y/N EC: (± 150µS/cm) Y/N	Nil	[redacted]	

Date of Bump Test	Site ID	Unit Brand/ Model	Ambient Air Oxygen Calibration	Zero % Oxygen Solution Calibration	Standard Concentrations	Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?	Comment	Test by (Name)	(Signature)
24/11/22	0053-MeHA	YSI # 21D101799	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y N pH 7.00 Y N EC: ~~1,413µS/cm~~ 25,000 Y N	30.2	pH 4.00: pH 7.00: 7.18 EC: 34,999	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y N	N.I	[redacted]	
25/11/22	0053-MeHA	YSI # 22F101611	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: ~~1,413µS/cm~~ 25,000 Y N	29.9	pH 4.00: 4.17 pH 7.00: 7.15 EC: 34,953	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N	N.I	[redacted]	
25/11/22	0053-MeHA	YSI # 21D101799	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: ~~1,413µS/cm~~ 35,000 Y N	29.8	pH 4.00: 4.15 pH 7.00: 7.14 EC: 35,115	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N	N.I	[redacted]	
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 21D101799
Cable length: 1m 21B100351

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	0.0.78
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	172.60 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.25
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 10 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	18.8	0	°C	NA	18.8	°C
pH (22D)	pH 7.00	375757	7.01	-3.80	mV	7.06	7.01	pH
pH (22D)	pH 4.00	378281	4.00	168.80	mV	4.03	4.00	pH
Conductivity (21B100530)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.07	2802	2764	µs/cm
ORP (210322SIA605102)	Zobell A & B	22/0103	243	243	mV	230.8	232.2	mV
Zero DO (20K100253)	NaSO3 in distilled water	10175	0.0	NA	NA	-0.3	0.0	%
100% DO (20K100253)	100% Air Saturation	Air	100.0	5.1	uA	105.8	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 11-Nov-22
Next Due: 10-May-23

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 22F106114
Cable length: 1m 14B100466

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.20 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.5
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 11 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	18.6	-0.1	°C	NA	18.5	°C
pH (21M)	pH 7.00	375757	7.01	-19.00	mV	7.33	7.01	pH
pH (21M)	pH 4.00	378281	4.00	154.20	mV	4.33	4.00	pH
Conductivity (14R100330)	2764 µs/cm at 25°C	21/1012	2764	GLP	4.99	2765	2764	µs/cm
ORP (19D)	Zobell A & B	22/0103	243	243	mV	212.8	232.6	mV
Zero DO (19D100526)	NaSO3 in distilled water	10175	0.0	NA	NA	2.3	0.0	%
100% DO (19D100526)	100% Air Saturation	Air	100.0	4	uA	90.5	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 11-Nov-22
Next Due: 10-May-23

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20D101039
Cable length: 1m 20A100403

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.00 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.53
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 4 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature (11H100544)	Check Temp NATA	Room Temp	18.6	-1.1	°C	NA	17.5	°C
pH (21K)	pH 7.00	375757	7.01	-8.60	mV	7.05	7.01	pH
pH (21K)	pH 4.00	378281	4.00	164.40	mV	4.03	4.00	pH
Conductivity (11H100544)	2764 µs/cm at 25°C	21/1012	2764	GLP	4.84	2773	2764	µs/cm
ORP (200408SIA605101)	Zobell A & B	22/0103	246	246	mV	239.9	241.8	mV
Zero DO (20B140053)	NaSO3 in distilled water	10175	0.0	NA	NA	0.2	0.0	%
100% DO (20B140053)	100% Air Saturation	Air	100.0	4.96	uA	98.3	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 09-Nov-22
Next Due: 08-May-23

APPENDIX

E

DATA QUALITY REVIEW

Cardno

now

Stantec

Data Quality Review
PFAS Ongoing Monitoring Plan
November 2022 Monitoring Event

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
	QA Documentation
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out between the 23rd and 25th November 2022 and is generally in accordance with the proposed scope of work, as documented in the SAQP (PFAS OMP SAQP HEH-A, Cardno, November 2022) issued to the client and in general compliance with Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling,* NEPM "*National Environment Protection (Assessment of Site Contamination) Measure"* and PFAS NEMP 2.0. A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (PFAS OMP November 2022 Factual Report). In addition, a safety, health and environment work method statement (SHEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
	Data Representativeness
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. Holding times were in compliance with required timeframes.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report and was in general conformance with the SAQP. Non-disposable equipment was decontaminated between sample locations.
Laboratory Reports	The following laboratory reports were considered for this data quality review: ▪ ALS reports: EP2215793, EP2215794, EP2215816, EP2215817, EP2215818, EP2215819, EP2215820, EP2215848, EP2215849, EP2215870, EP2215871, EP2215920, EP2215921, EP2215976. ▪ Eurofins ARL report: 945147

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td colspan="2">Data Precision & Accuracy</td></tr>
<tr><td>QC sample Frequency</td><td>
<table>
<tr><th>QC sample type</th><th>SAQP required frequency</th><th>Sample Collected</th></tr>
<tr><td>Blind duplicate</td><td>1 in 10 primary samples (10%)</td><td>5 for 41 groundwater samples (12.2%)
1 in 5 sediment samples (20%)</td></tr>
<tr><td>Interlab duplicate</td><td>1 in 10 primary samples (10%)</td><td>5 for 41 groundwater samples (12.2%)
1 in 5 sediment samples (20%)</td></tr>
<tr><td>Rinsate</td><td>1 per field personnel per day</td><td>7 for 3 days (2-3 field personnel) (100%)</td></tr>
<tr><td>Field Blank</td><td>1 per field personnel per day</td><td>7 for 3 days (2-3 field personnel) (100%)</td></tr>
</table>
The required QC frequency was achieved for all media sampled.
</td></tr>
<tr><td>RPD Acceptance criteria</td><td>
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
</td></tr>
<tr><td>QC Testing – Blind Duplicates (Primary Lab)</td><td>
Groundwater
▪ Primary Groundwater Samples Analysed: 41
▪ Blind Duplicate Samples Analysed: 5
All RPDs were within acceptance criteria.
Sediment
▪ Primary Sediment Samples Analysed: 5
▪ Blind Duplicate Samples Analysed: 1
All RPDs were within acceptance criteria.
</td></tr>
<tr><td>QC Testing – Interlab Duplicates (Secondary Lab)</td><td>
Groundwater
▪ Primary Groundwater Samples Analysed: 41
▪ Interlab Duplicate Samples Analysed: 5
All RPDs were within acceptance criteria with the following exceptions:
▪ QC228 (6:2 FTS – 29%, 8:2 FTS – 32%)
These minor exceedances for a limited number of analytes are likely due the difference of methodologies between the primary and secondary laboratories and the low concentrations of analytes under review. This is not considered to have impacted the validity of the interpretation drawn upon this dataset.
Sediment
▪ Primary sediment Samples Analysed: 5
▪ Interlab Duplicate Samples Analysed: 1
All RPDs were within acceptance criteria.
</td></tr>
<tr><td>Field Blanks</td><td>Field Blanks were collected at a rate of one per fieldwork team per day. All field blank samples tested reported analytes below the laboratory limit of reporting.</td></tr>
<tr><td>Laboratory Internal QC</td><td>Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, matrix spikes, laboratory control samples and laboratory duplicates.
All Method Blank results were within acceptable range.
All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following:</td></tr>
</table>

QA/QC Aspects	Evidence & Evaluation
	▪ EP2215793, EP2215816, EP2215818, EP2215819, EP2215820, EP2215848, EP2215870, EP2215871, EP2215920, EP2215921, EP2215976: - Samples ID: anonymous, MW116, MW134: Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. No quality control samples frequency outliers were reported. The above exceptions are not considered to affect the reliability of the dataset.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins ARL Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use and daily readings of reference solutions (bump tests) were completed. The equipment calibration certificates, and daily field bump test records are provided in Appendix D. The pH probe of one WQM failed on 23/11/22. This WQM was not used for the remaining of the event.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day per sampler when reusable equipment was used. All rinsate samples tested reported analytes concentrations below the laboratory LORs.
Data Comparability	
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
Data Completeness	
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process and therefore, the data set used as the basis for groundwater, surface water, porewater and sediment investigation is considered valid and complete.

PFAS OMP Biannual Monitoring Event Factual Report

June 2023

Naval Communication Station Harold E Holt Area A

Prepared for

Department of Defence

30 August 2023

Cardno

now

Stantec

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluorohexane Sulphonate
PFOA	Per-fluorooctanoic Acid
PFOS	Per-fluorooctane Sulfonate
TDS	Total Dissolved Solids (salinity of water)

Technical Terms

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
HEPA	Heads of Environmental Protection Authority
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
SWL	Standing Water Level

Units

ha	Hectares
mAHD	Metres relative to the Australian Height Datum
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
meq/L	Milliequivalents per Litre
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µg/L	Microgram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

HEH-A	Naval Communication Station Harold E Holt Area A
OMP	Ongoing Monitoring Plan

1 Introduction

1.1 Background

Cardno, now Stantec ("Cardno") was engaged by the Australian Department of Defence ("Defence") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) biannual monitoring event at the Naval Communication Station Harold E Holt - Area A ("HEH-A" or "the site"). The site is situated at the end of the North West Cape of Western Australia (WA), at the northern edge of Exmouth (Figure 1, Appendix A).

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

> Cardno, June 2023, Reference: 304700525, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A*. Rev 6

The SAQP was reviewed prior to the monitoring event and the following changes were made:

> M123 (no longer accessible due to asbestos hazard) was removed from the groundwater monitoring network.

> Co-located monitoring location SD/SW112 (no longer accessible) was replaced by SD/SW131.

> Co-located monitoring location SD/SW120 (no longer accessible) was replaced by SD/SW121.

For the purposes of this report:

> "the site" was defined as Harold E Holt – Area A.

> "the Management Area" was defined as comprising the site, plus the land extending to the Exmouth Gulf (to the east, north and north-west). The Monitoring Area is presented on Figure 2, Appendix A.

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

> To provide a succinct summary of the June 2023 monitoring event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

> To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

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

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) 2.0*.

> Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 1 - Non-volatile and semi-volatile compounds[1].

[1] It is noted that this AS has been withdrawn and is referenced here as a state of knowledge document.

> Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.

> Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

> Department of Water and Environmental and Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*[2].

> Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.

> U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process (EPA QA/G-4)*.

> U.S. EPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

> National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater bores was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The groundwater bores monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 4, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse	MW017; MW019; MW027; MW101; MW102; MW103; MW1043, MW213; MW214	9
Fuel Farm	MW004; MW008; MW105; MW119; MW210; MW212	6
Powerhouse pathway	MW113; MW114; MW115; MW116; MW117; MW217; MW218	7
Fuel farm pathway	MW107; MW109; MW110; MW111; MW112; MW202	6
Broader area	MW129; MW130; MW134	3

2.2 Seepage water Monitoring

Sampling of selected seepage water monitoring locations was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The seepage water locations monitored as part of the OMP are presented in Table 2-2 and are shown on Figure 4, Appendix A.

Table 2-2 Seepage water Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse pathway	OTH105; OTH106; OTH107; OTH108	4
Fuel farm pathway	OTH101; OTH103; OTH104	3
Broader area	OTH102; OTH109; OTH110; OTH113	4
Murat Pier saltwater discharge water	OTH002	1

[2] It is noted that the site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of offsite private properties and waterways.

2.3 Surface water Monitoring

Sampling of selected surface water monitoring locations was performed in general accordance with the SAQP, applying methods set out in Section 3 of this report. The surface water locations monitored as part of the OMP are presented in Table 2-3 and are shown on Figure 4, Appendix A.

Table 2-3 Surface water Monitoring Locations

Monitoring Area	Location ID	Number
Broader area	SW131; SW121; SW126; SW127; SW128	5
Powerhouse	SW113	1

2.4 Sediment Monitoring

Sampling of selected sediment monitoring locations was performed in accordance with the SAQP, applying methods set out in section 3 of this report. The sediment locations monitored as part of the OMP are presented in Table 2-4 and are shown on Figure 5, Appendix A.

Table 2-4 Sediment Monitoring Locations

Monitoring Area	Location ID	Number
Broader area	SD131, SD121, SD126, SD127; SD128	5
Powerhouse	SD113	1

2.5 Data Management

All the data included in the report has been collected, uploaded and reviewed according to the data management requirements of the *Defence Contamination Management Manual* (DCMM Annex L), including:

- The sample naming convention detailed in the DCMM Annex L was used in the field;
- All field data collected was uploaded to the ESdat database;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.6 Deviations from the OMP SAQP

Deviations from the SAQP (Cardno, 2023) for the June 2023 monitoring event are presented in Table 2-5.

Table 2-5 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
MW217	Not Sampled	Monitoring well was found blocked (assumed by roots). No impact on OMP, adjacent (<50m) well MW218 was sampled.
MW004	No standing water level (SWL) recorded	Well PVC casing found bent, survey data unreliable. No impact on the OMP, nearby wells were used to infer groundwater levels and flow direction.
MW008	Not sampled	Well found damaged (assumed by recent earthworks). Limited impact on the OMP, other wells are monitored in the vicinity of the POL area.
OTH002	Not Sampled	Murat Pier saltwater discharge point not flowing. No impact on the OMP.
SW121; SW126; SW127; SW131	Not Sampled	Monitoring locations found dry. No impact on existing dataset, these locations are often dry. Sediment samples collected and analysed for PFAS.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken applying the methods detailed in Table 3-1.

Table 3-1 Groundwater Sampling Method

Activity	Details
Well Gauging	SWL were gauged using an interface probe. All wells were measured against a surveyed mark at the top of the well casing.
Groundwater Field Parameters	Groundwater field parameters were recorded via a water quality meter prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters were recorded: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates are provided in Appendix D.
Deployment and Retrieval of HydraSleeves® (single level well sample collection)	HydraSleeves® were deployed with top weight sample collection to begin at the lowest point. HydraSleeves® sampling devices were left in wells for a minimum of 24 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube. Following sampling, HydraSleeves® were deployed in preparation for the next OMP monitoring event using the same string for consistency between events (same depth of sampling i.e. within screen).
Peristaltic pump (multi-level well sample collection)	The shallowest (non-dry) wells were sampled at each multi-level well location using Teflon-free dedicated and disposable high-density polyethylene (HDPE) tubing coupled to a peristaltic pump system. The groundwater was purged at a low flow rate of 0.2 L/min. SWL and field parameters were measured during purging and post sample collection to ensure limited drawdown effects. The groundwater was sampled when the field parameters had stabilised.
Alternative sampling methodology (hand bailing)	Disposable HDPE hand bailers, attached to a polypropylene string, were used when the water column wasn't sufficient to fill the HydraSleeves®. Purging of the well (removal of 3x well volume) was undertaken prior to sampling to ensure that a sample representative of the aquifer is taken. Field parameters were regularly recorded during the bailer purge to confirm field parameter stability was achieved.
Decontamination procedure	Dedicated HydraSleeves®/tubing were used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container was pre-labelled by the laboratory with a unique barcode for identification. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).

Activity	Details
Laboratory Testing	Groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity, and ionic balance). The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins ARL (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.
Laboratory Testing – Quality Control	Groundwater QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2023): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.2 Seepage water Sampling Methodology

Seepage water monitoring procedure is detailed in Table 3-2.

Table 3-2 Seepage water Sampling Method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: ▪ pH ▪ EC ▪ ORP ▪ DO ▪ Temperature Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Sampling was carried out in a two-hour period; one hour each side of the low tide. Sampling protocol involved a shallow excavation in the beach sand; just above where inundation by wave action is occurring. Sampling containers were lowered into the exposed seepage water and filled.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container will be pre-labelled by the laboratory with a unique barcode for identification. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Seepage water samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).

Activity	Details
Laboratory Testing – Quality Control	Seepage water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2023): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.3 Surface water Sampling Methodology

Surface water monitoring procedure is detailed in Table 3-3.

Table 3-3 Surface water Sampling Method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: ▪ pH ▪ EC ▪ ORP ▪ DO ▪ Temperature Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long handled sampling device. Where water body depth was sufficient, the sample container was positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container will be pre-labelled by the laboratory with a unique barcode for identification. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Surface water samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Surface water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2023): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.4 Sediment Sampling Methodology

Sediment sampling methodology is detailed in Table 3-4.

Table 3-4 Sediment Sampling Method

Activity	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, shovel, etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation. At each sampling location, the sediment sample was visually assessed and observations (including physical description) recorded on field data sheets.
Field Records	The following information was recorded on the field data sheets: ▪ Sampling time and date. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes).
Laboratory Testing – Quality Control	Sediment QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2023): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment samples and sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.

3.5 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

> QA documentation.
> Bias.
> Data Representativeness.
> Data Precision & Accuracy.
> Laboratory Performance.
> Data Comparability.
> Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E.

The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.6 Assessment Criteria

3.6.1 Groundwater, Seepage water and Surface water

The adopted assessment criteria for groundwater, seepage water and surface water are detailed in Table 3-5.

Table 3-5 Criteria for Groundwater, Seepage water and Surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health – Recreational Water	2[1]	10	NHMRC 2019, HEPA 2020
Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

1. Sum of PFOS and PFHxS.
2. PFOS only; Practical screening guideline of 0.01 µg/L is based on typical current laboratory limit of reporting. Therefore, it should be noted that warning and action levels would not be relevant until the detection limits are reduced or the screening levels are increased (HEPA 2020).

3.6.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Sediment results have been compared to available historical data for the purpose of this assessment.

4 Field Observations and Results

4.1 General Observations

No significant weather event or site activities that could have impacted the monitoring event or results obtained were noted during the June 2023. No rainfall occurred leading to or during the June 2023 monitoring event and the daily maximum temperatures varied between 21.8 and 24.9°C.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physicochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling records, included in Appendix D. Groundwater was brackish to saline [total dissolved solids (TDS) ranging from 848 mg/L (MW213) to 35,230 mg/L (MW114)], near neutral to slightly alkaline [pH 7.12 (MW101) to 8.2(MW214)]. Groundwater temperature was on average 24°C, DO readings generally indicate aerobic groundwater condition. Field parameters were consistent with previous monitoring events.

4.2.1.2 Groundwater Elevation and Migration

Groundwater elevation ranged from -0.04 mAHD (MW019) to 2.384 mAHD (MW109).

Groundwater flow direction was interpreted to follow the site topography and be radial from the sand dunes east of site, where mounding is occurring, which is consistent with the previous monitoring events.

Groundwater elevation contours and flow direction are shown in Figure 3, Appendix A. Gauging records are presented in Appendix D.

4.2.2 Groundwater Laboratory Results

4.2.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data in order to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the groundwater monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	10[2]	0.68 (MW017)	29	0
PFOS	MW004, MW017, MW019, MW027, MW102, MW103, MW105, MW107, MW111, MW119, MW210, MW214.	0.01[3]	13.9 (MW017)	29	12
Sum of PFOS and PFHxS	MW017, MW027, MW119	2[2]	15.1 (MW017)	29	3

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

> MW027 located at the Powerhouse reported a new exceedance of the recreational use guideline values for the Sum of PFOS and PFHxS (2.0 µg/L, 2.03 µg/L detected). It is however noted that the duplicate and triplicate samples taken at the same location were below the criteria.

4.2.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 9.98 (MW214) and 558 (MW114) meq/L. Total cations concentrations ranged from 6.2 (MW214) and 650 (MW114) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.3 Seepage Water

4.3.1 Summary of Field Observations

Stabilised physicochemical parameters, water colour and turbidity observations recorded during the seepage water sampling program are presented in field sampling records, included in Appendix D. Water temperature was on average 17.9ºC, water condition was slightly alkaline [pH 8.08 (OTH107-108) to 8.36 (OTH106)], saline [TDS ranging from 28,264 (OTH105) to 55,496 mg/L (OTH107)] and DO readings ranging from 4.5 (OTH113) to 6.85 mg/L (OTH107) indicate aerobic conditions. Field parameters were generally consistent with previous monitoring events.

4.3.2 Laboratory Results

4.3.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the seepage water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-2 Summary of Seepage water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	10[2]	<0.01	11	0
PFOS	-	0.01[3]	<0.01	11	0
Sum of PFOS and PFHxS	-	2[2]	<0.01	11	0

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

> There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the November 2022 monitoring event.

> All samples analysed reported PFAS concentrations below the laboratory LOR.

4.3.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 541 (OTH102) and 588 (OTH107) meq/L. Total cations concentrations ranged from 568 (OTH103) and 671 (OTH107) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.4 Surface water

4.4.1 Summary of Field Observations

Two surface water locations were sampled (SW128 & SW113) as the other four were dry during the June 2023 monitoring event. The field parameters for MW128 and SW113 are presented in table D2 of Appendix D and were consistent with previous monitoring events.

4.4.2 Laboratory Results

4.4.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-3. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the seepage water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-3 Summary of Surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	10[2]	0.26 (SW113)	2	0
PFOS	SW113	0.01[3]	0.68	2	1
Sum of PFOS and PFHxS	-	2[2]	1.17 (SW113)	2	0

Notes:

4. Non-inclusive of quality control samples
5. HEPA 2020 guideline value for human health – Recreational Use
6. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

- There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the surface water monitoring locations during the June 2023 monitoring event.
- One out of two samples analysed reported PFAS concentrations below the laboratory LOR.

4.4.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 9.90 (SW113) and 3,940 (SW128) meq/L. Total cations concentrations ranged from 11.0 (SW113) and 3,930 (SW128) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

Tabulated analytical results are provided within Appendix B. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA were reported. Figure 5 in Appendix A presents the sediment monitoring locations. The laboratory reports are provided in Appendix C.

Findings are summarised as follows:

- SD128 reported a first-time detection of Sum of PFOS and PFHxS (0.0003 mg/kg detected) during the June 2023 monitoring event. It is however noted that the duplicate and triplicate samples taken at this location didn't detect concentrations above the LOR (0.0002 mg/kg).
- Four out of six sediment samples reported PFAS concentrations below the laboratory LOR.

4.6 Changes to the Monitoring Network Condition

The following changes to the monitoring network condition were observed during the June 2023 monitoring event:

- MW004 at the POL area had a bent PVC casing and therefore, the well survey data for the top of casing is no longer accurate.
- MW008 at the POL area was found blocked with a damaged PVC casing below ground level.
- MW217 was found blocked (assumed by tree roots)

5 Summary and Conclusions

Cardno undertook the June 2023 groundwater, seepage water, surface water and sediment biannual monitoring event at HEH-A as part of the PFAS OMP. Sampling and testing was undertaken at 29 groundwater monitoring bores, two surface water monitoring locations, 11 seepage water sampling locations and six sediment monitoring locations. Four surface water monitoring locations were found dry and. One groundwater monitoring well (MW008) was found damaged, and one groundwater monitoring well was found blocked by tree roots (MW217).

Groundwater levels were gauged in all wells before sampling. Groundwater flow direction was interpreted to be radial from the site, following the site's topography with mounding occurring beneath the sand dunes, which is consistent with the previous monitoring events.

The groundwater laboratory results reported the following:

- Of the 29 samples that were tested, PFOS (12 samples) and Sum of PFOS and PFHxS (3 samples) reported concentrations that exceeded the HEPA (2020) ecological guideline value for 99% protection species and HEPA (2020) guideline value for recreational use respectively.
- MW027 located at the Powerhouse reported a new exceedance of the recreational use guideline values for the Sum of PFOS and PFHxS (2.0 µg/L, 2.03 µg/L detected). It is however noted that the duplicate and triplicate samples taken at the same location were below the criteria.

The seepage water laboratory results reported the following:

- All 11 seepage water samples analysed reported PFAS concentrations below the laboratory LOR.
- There was no first-time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the seepage water monitoring locations during the June 2023 monitoring event.

The surface water laboratory results reported the following:

- There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the surface water monitoring locations during the June 2023 monitoring event.
- One out of two samples analysed reported PFAS concentrations below the laboratory LOR.
- SW113 reported an exceedance of the HEPA (2020) ecological guideline value for 99% protection species for PFOS.

The sediment laboratory results reported the following:

- SD128 reported a first-time detection of Sum of PFOS and PFHxS (0.0003 mg/kg detected) during the June 2023 monitoring event. It is however noted that the duplicate and triplicate samples taken at this location didn't detect concentrations above the LOR (0.0002 mg/kg).
- Four out of six sediment samples reported PFAS concentrations below the laboratory LOR.

It is recommended that MW217 is unblocked prior to the next monitoring event.

The next OMP sampling event for HEH-A will be the November 2023 monitoring event. An Annual Interpretive Report will be prepared for the July 2021 – June 2022 monitoring period.

6 References

General References

1. Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds*.
2. Australian Standard AS 4482-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances*.
3. ANZECC and ARMCANZ, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2018).
4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of Defence, May 2021, *PFAS OMP Factual Report Guidance* Version 0.2.
6. Department of Defence, July 2018 amended June 2021, *Contamination Management Manual*, Annex L *Guidance on Data Management*.
7. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia.
8. Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*.
9. DWER, 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
10. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, *Guidance on Environmental Data Verification and Data Validation.*
11. The Heads of EPAs Australia and New Zealand (HEPA; 2020) *PFAS National Environmental Management Plan* (NEMP) 2.0, January 2020.
12. National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended), registered May 2013.
13. National Health and Medical Research Council (NHMRC) National Water Quality Management Strategy, *Australian Drinking Water Guidelines 6*, (2011, as updated 2022).
14. NHMRC, August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.
15. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*.
16. U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process* (EPA QA/G-4).
17. U.S. EPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

Site Specific References

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APPENDIX

A

FIGURES

Cardno

now

Stantec

FIGURE 1

1:100,000 Scale at A3

Metres

0 1,500 3,000

Site Location

JUNE 2023 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-07-13 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 2

1:25,000 Scale at A3

Metres

0 500 1,000

Management Area

JUNE 2023 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-07-13 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 02.mxd

MW129 (0.366)
MW130 (0.13)
MW134 (0.399)
MW109 (2.384)
MW110 (0.366)
MW202 (0.569)
MW119 (0.217)
MW105 (0.298)
MW210 (0.383)
MW111 (0.516)
MW212 (0.393)
MW112 (0.524)
MW101 (0.002)
MW027 (0.03)
MW102 (0.053)
MW213 (0.12)
MW113 (0.41)
MW017 (0.043)
MW104 (0.051)
MW114 (0.342)
MW115 (0.218)
MW218 (0.178)
MW116 (0.329)
MW117 (0.255)
2
1.8
1.4
1.2
1
0.8
0.6
0.4
0.2
0.1
0.3
Legend
Monitoring Wells (Jun-23 RWL, mAHD)
Inferred Groundwater Contours (mAHD)
groundwater flow direction
FIGURE 3
1:24,000 Scale at A3
Metres
0
500
1,000
Inferred Groundwater Contours
JUNE 2023 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2023-07-24 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_Jun23_GWContours 02.mxd

MW102
MW101
SW113
MW019
MW103
MW027
MW213
MW017
MW214
MW104
MW105
MW210
MW008
MW212
MW004
MW129
SW121
OTH113
MW130
OTH110
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW111
OTH002
OTH103
MW107
MW112
OTH104
MW113
MW114
OTH105
MW134
MW119
MW217
MW115
OTH106
MW218
MW116
OTH108
MW117
SW126
SW131
SW127
SW128
Legend
Management Area
PFAS Source Area (GHD, 2018)
Results Summary
No first-time detection or new exceedance
First-time detection of PFOA or PFOS+PFHxS
New exceedance of a guideline value
Not Sampled
FIGURE 4
1:25,000 Scale at A3
Metres
0
500
1,000
Water Monitoring Locations & Results
JUNE 2023 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2023-07-25 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-004_Jun23_W_Results 01.mxd

FIGURE 5

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Monitoring Locations & Results

JUNE 2023 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-07-25 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-005_Jun23_S_Results 01.mxd

APPENDIX

B

DATA ASSESSMENT TABLES

Cardno

now

Stantec

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sul			
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.02	0.05	0.02	0.05
PFAS NEMP 2020 Interim Marine 99%									0.00023*						19														
PFAS NEMP 2020 Recreational Water															**10**														
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																										
	27/06/2023	**0083_QC301_230627**	**Rinsate**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
	27/06/2023	**0083_QC302_230627**	**Rinsate**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
	27/06/2023	**0083_QC303_230627**	**Rinsate**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
	27/06/2023	**0083_QC401_230627**	**Field Blank**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
	27/06/2023	**0083_QC402_230627**	**Field Blank**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
	27/06/2023	**0083_QC403_230627**	**Field Blank**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW004	**27/06/2023**	**0083_MW004_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.03	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW017	**27/06/2023**	**0083_MW017_230627**	**Normal**	**EP2308621**	0.05	0.05	1.20	0.11	13.9	<0.02	1.1	3.24	3.34	2.10	0.68	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.36	0.28	<0.05	<0.02	<0.05	<0.02	<0.05
MW017	**27/06/2023**	**0083_QC114_230627**	**Field Duplicate**	**EP2308621**	0.08	0.11	4.46	0.06	5.05	<0.02	4.6	9.92	11.5	8.23	2.35	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	4.63	0.49	<0.05	<0.02	<0.05	<0.02	<0.05
MW017	**27/06/2023**	**0083_QC214_230627**	**Interlab Duplicate**	**1004390**	0.06	0.16	4.1	0.08	4.9	<0.01	3.9	12	14	8.6	2.2	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.4	0.32	<0.01	<0.05	<0.05	<0.05	<0.05
MW019	**27/06/2023**	**0083_MW019_230627**	**Normal**	**EP2308621**	<0.02	<0.02	0.05	<0.02	0.01	<0.02	<0.3	0.06	0.04	0.05	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW019	**27/06/2023**	**0083_QC113_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.02	0.05	<0.02	0.01	<0.02	<0.2	0.04	0.04	0.04	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW019	**27/06/2023**	**0083_QC213_230627**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	0.04	<0.01	0.01	<0.01	<0.05	0.04	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05
MW027	**27/06/2023**	**0083_MW027_230627**	**Normal**	**EP2308621**	0.08	0.08	1.62	0.03	0.41	<0.02	0.2	0.64	0.61	0.27	0.10	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW027	**27/06/2023**	**0083_QC111_230627**	**Field Duplicate**	**EP2308621**	0.03	0.02	0.63	<0.02	0.21	<0.02	<0.2	0.20	0.21	0.11	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW027	**27/06/2023**	**0083_QC211_230627**	**Interlab Duplicate**	**1004390**	0.05	0.02	0.55	<0.01	0.18	<0.01	0.10	0.21	0.22	0.10	0.05	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05
MW101	**27/06/2023**	**0083_MW101_230627**	**Normal**	**EP2308621**	<0.03	<0.02	0.17	<0.02	<0.01	<0.02	<0.2	0.08	0.10	0.07	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW102	**27/06/2023**	**0083_MW102_230627**	**Normal**	**EP2308621**	<0.03	0.03	0.24	<0.02	0.07	<0.02	<0.2	0.21	0.19	0.15	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW103	**27/06/2023**	**0083_MW103_230627**	**Normal**	**EP2308621**	0.10	0.10	0.71	<0.02	0.07	<0.02	0.4	1.10	1.02	0.33	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW104	**27/06/2023**	**0083_MW104_5.5-6.0_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW105	**27/06/2023**	**0083_MW105_4.0-4.5_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.07	<0.02	0.06	<0.02	<0.1	0.06	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW107	**27/06/2023**	**0083_MW107_3.1-4.1_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW109	**27/06/2023**	**0083_MW109_6.5-7.0_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW110	**27/06/2023**	**0083_MW110_9.0-9.5_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW111	**27/06/2023**	**0083_MW111_8.5-9.0_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW112	**27/06/2023**	**0083_MW112_4.5-5.0_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW113	**27/06/2023**	**0083_MW113_2.5-3.5_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW114	**27/06/2023**	**0083_MW114_4.5-5.0_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW114	**27/06/2023**	**0083_QC110_230627**	**Field Duplicate**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW114	**27/06/2023**	**0083_QC210_230627**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05
MW115	**27/06/2023**	**0083_MW115_2.0-3.0_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW116	**27/06/2023**	**0083_MW116_4.5-5_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW117	**27/06/2023**	**0083_MW117_4.0-4.5_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW119	**27/06/2023**	**0083_MW119_230627**	**Normal**	**EP2308617**	0.78	1.08	9.14	0.12	0.24	<0.02	0.4	0.97	3.16	0.27	0.20	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW129	**27/06/2023**	**0083_MW129_1.5-2.0_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW130	**27/06/2023**	**0083_MW130_3.4-3.9_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW134	**27/06/2023**	**0083_MW134_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW202	**27/06/2023**	**0083_MW202_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW210	**27/06/2023**	**0083_MW210_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.09	<0.02	0.05	<0.02	<0.1	0.12	0.10	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW212	**27/06/2023**	**0083_MW212_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW213	**27/06/2023**	**0083_MW213_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW213	**27/06/2023**	**0083_QC112_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW213	**27/06/2023**	**0083_QC212_230627**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05
MW214	**27/06/2023**	**0083_MW214_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
MW218	**27/06/2023**	**0083_MW218_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH101	**27/06/2023**	**0083_OTH101_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH102	**27/06/2023**	**0083_OTH102_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH103	**27/06/2023**	**0083_OTH103_230627**	**Normal**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH104	**27/06/2023**	**0083_OTH104_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH105	**27/06/2023**	**0083_OTH105_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH106	**27/06/2023**	**0083_OTH106_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH107	**27/06/2023**	**0083_OTH107_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH108	**27/06/2023**	**0083_OTH108_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH109	**27/06/2023**	**0083_OTH109_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH110	**27/06/2023**	**0083_OTH110_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
OTH113	**27/06/2023**	**0083_OTH113_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
SW113	**27/06/2023**	**0083_SW113_230627**	**Normal**	**EP2308623**	<0.02	<0.02	0.49	<0.02	0.68	<0.02	0.5	4.84	1.77	0.90	0.26	0.10	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.77	0.42	<0.05	<0.02	<0.05	<0.02	<0.05
SW128	**27/06/2023**	**0083_QC108_230627**	**Field Duplicate**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05
SW128	**27/06/2023**	**0083_QC208_230627**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05
SW128	**27/06/2023**	**0083_SW128_230627**	**Normal**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
* Practical screening value of 0.01 µg/L adopted based on current laboratory limit of reporting (HEPA, 2020)
First-time detection of PFOA or PFOS+PFHxS
New exceedance of guideline value

					fonamides			PFAS			Inorganics									Metals			
					N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01	0.01	1	0.01	1	1	1	1	1
PFAS NEMP 2020 Interim Marine 99%																							
PFAS NEMP 2020 Recreational Water								**2**															
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																			
	27/06/2023	**0083_QC301_230627**	**Rinsate**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
	27/06/2023	**0083_QC302_230627**	**Rinsate**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
	27/06/2023	**0083_QC303_230627**	**Rinsate**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
	27/06/2023	**0083_QC401_230627**	**Field Blank**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
	27/06/2023	**0083_QC402_230627**	**Field Blank**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
	27/06/2023	**0083_QC403_230627**	**Field Blank**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
MW004	**27/06/2023**	**0083_MW004_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	0.09	0.09	0.09	<1	253	<1	253	45.9	48	1,270	2.23	241	104	114	43	743
MW017	**27/06/2023**	**0083_MW017_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	**15.1**	28.2	28.5	<1	367	<1	367	224	250	6,840	5.46	1,150	277	568	218	4,230
MW017	**27/06/2023**	**0083_QC114_230627**	**Field Duplicate**	**EP2308621**	<0.05	<0.02	<0.05	**9.51**	51.3	51.5	<1	364	<1	364	168	176	5,010	2.48	925	217	410	154	2,940
MW017	**27/06/2023**	**0083_QC214_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	**9**	56.48	56.8													
MW019	**27/06/2023**	**0083_MW019_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	0.06	0.21	0.21	<1	295	<1	295	216	232	6,810	3.58	856	256	517	185	3,950
MW019	**27/06/2023**	**0083_QC113_230627**	**Field Duplicate**	**EP2308621**	<0.05	<0.02	<0.05	0.06	0.18	0.18	<1	325	<1	325	271	312	8,520	7.15	1,150	313	696	251	5,360
MW019	**27/06/2023**	**0083_QC213_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	0.05	0.12	0.12													
MW027	**27/06/2023**	**0083_MW027_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	**2.03**	3.93	4.06	<1	319	<1	319	229	268	7,010	7.88	1,210	292	605	245	4,550
MW027	**27/06/2023**	**0083_QC111_230627**	**Field Duplicate**	**EP2308621**	<0.05	<0.02	<0.05	0.84	1.44	1.46	<1	317	<1	317	250	295	7,640	8.36	1,330	303	665	268	5,020
MW027	**27/06/2023**	**0083_QC211_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	0.73	1.46	1.51													
MW101	**27/06/2023**	**0083_MW101_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	0.17	0.44	0.44	<1	791	<1	791	246	296	7,620	9.30	734	227	696	271	5,080
MW102	**27/06/2023**	**0083_MW102_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	0.31	0.91	0.94	<1	332	<1	332	244	256	7,630	2.28	1,090	258	584	245	4,340
MW103	**27/06/2023**	**0083_MW103_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	0.78	3.78	3.88	<1	317	<1	317	198	225	5,930	6.44	1,170	275	511	213	3,770
MW104	**27/06/2023**	**0083_MW104_5.5-6.0_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	376	<1	376	166	184	5,000	4.94	857	250	431	171	3,020
MW105	**27/06/2023**	**0083_MW105_4.0-4.5_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	0.13	0.25	0.25	<1	240	<1	240	294	338	9,140	7.00	1,490	280	822	291	5,720
MW107	**27/06/2023**	**0083_MW107_3.1-4.1_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	299	<1	299	512	584	16,200	6.50	2,370	413	1,340	522	10,100
MW109	**27/06/2023**	**0083_MW109_6.5-7.0_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	631	<1	631	472	570	14,600	9.41	2,300	404	1,280	526	9,920
MW110	**27/06/2023**	**0083_MW110_9.0-9.5_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	262	<1	262	192	206	6,080	3.77	712	206	446	202	3,550
MW111	**27/06/2023**	**0083_MW111_8.5-9.0_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	787	<1	787	448	485	13,900	3.94	1,940	367	1,120	426	8,360
MW112	**27/06/2023**	**0083_MW112_4.5-5.0_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	249	<1	249	523	602	16,600	6.97	2,400	422	1,390	539	10,400
MW113	**27/06/2023**	**0083_MW113_2.5-3.5_230627**	**Normal**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	951	<1	951	411	489	12,500	8.66	1,890	346	1,100	446	8,500
MW114	**27/06/2023**	**0083_MW114_4.5-5.0_230627**	**Normal**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	548	<1	548	558	650	17,500	7.59	2,580	462	1,460	598	11,300
MW114	**27/06/2023**	**0083_QC110_230627**	**Field Duplicate**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	435	<1	435	550	628	17,300	6.64	2,540	456	1,410	578	10,900
MW114	**27/06/2023**	**0083_QC210_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1													
MW115	**27/06/2023**	**0083_MW115_2.0-3.0_230627**	**Normal**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	183	<1	183	515	610	16,400	8.40	2,340	433	1,370	550	10,600
MW116	**27/06/2023**	**0083_MW116_4.5-5_230627**	**Normal**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	482	576	15,300	8.87	2,310	414	1,300	548	9,980
MW117	**27/06/2023**	**0083_MW117_4.0-4.5_230627**	**Normal**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	145	<1	145	65.4	70.4	2,060	3.70	210	115	118	91	1,210
MW119	**27/06/2023**	**0083_MW119_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	**9.38**	15.2	16.4	<1	291	<1	291	200	207	6,180	1.72	959	193	478	213	3,510
MW129	**27/06/2023**	**0083_MW129_1.5-2.0_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	273	<1	273	529	620	16,800	7.93	2,380	499	1,410	532	10,700
MW130	**27/06/2023**	**0083_MW130_3.4-3.9_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	312	<1	312	465	534	14,700	6.95	2,110	430	1,260	469	9,130
MW134	**27/06/2023**	**0083_MW134_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	270	<1	270	446	498	14,100	5.56	2,040	447	1,060	445	8,670
MW202	**27/06/2023**	**0083_MW202_230627**	**Normal**	**EP2308611**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	210	<1	210	370	391	11,700	2.79	1,710	291	764	258	7,060
MW210	**27/06/2023**	**0083_MW210_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	0.14	0.46	0.46	<1	167	<1	167	60.9	64.9	1,870	3.15	232	90	117	46	1,140
MW212	**27/06/2023**	**0083_MW212_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	220	<1	220	166	187	5,180	6.00	725	173	420	170	3,200
MW213	**27/06/2023**	**0083_MW213_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	219	<1	219	11.8	12.3	155	1.83	149	86	38	12	105
MW213	**27/06/2023**	**0083_QC112_230627**	**Field Duplicate**	**EP2308621**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	242	<1	242	13.1	13	181	0.39	153	86	40	12	118
MW213	**27/06/2023**	**0083_QC212_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1													
MW214	**27/06/2023**	**0083_MW214_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	0.08	0.08	0.08	<1	296	<1	296	9.98	6.2	100	23.4	60	23	19	7	76
MW218	**27/06/2023**	**0083_MW218_230627**	**Normal**	**EP2308621**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	204	<1	204	46.5	52.4	1,290	6.02	288	59	103	67	903
OTH101	**27/06/2023**	**0083_OTH101_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	546	650	17,400	8.61	2,560	454	1,460	594	11,300
OTH102	**27/06/2023**	**0083_OTH102_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	541	650	17,200	9.11	2,560	453	1,460	595	11,300
OTH103	**27/06/2023**	**0083_OTH103_230627**	**Normal**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	561	568	17,900	0.65	2,560	407	1,150	367	10,200
OTH104	**27/06/2023**	**0083_OTH104_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	122	<1	122	548	652	17,400	8.62	2,640	451	1,490	585	11,300
OTH105	**27/06/2023**	**0083_OTH105_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	131	<1	131	554	644	17,600	7.54	2,640	459	1,450	589	11,200
OTH106	**27/06/2023**	**0083_OTH106_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	271	<1	271	562	649	17,700	7.24	2,730	467	1,450	590	11,300
OTH107	**27/06/2023**	**0083_OTH107_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1	125	588	671	18,800	6.64	2,640	468	1,500	615	11,700
OTH108	**27/06/2023**	**0083_OTH108_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	155	<1	155	566	661	18,000	7.75	2,630	466	1,480	601	11,500
OTH109	**27/06/2023**	**0083_OTH109_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	546	649	17,400	8.62	2,540	446	1,460	598	11,300
OTH110	**27/06/2023**	**0083_OTH110_230627**	**Normal**	**EP2308612**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	543	638	17,300	7.99	2,540	445	1,430	584	11,100
OTH113	**27/06/2023**	**0083_OTH113_230627**	**Normal**	**EP2308617**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	547	641	17,500	7.91	2,440	446	1,470	573	11,100
SW113	**27/06/2023**	**0083_SW113_230627**	**Normal**	**EP2308623**	<0.05	<0.02	<0.05	1.17	10.6	10.7	<1	97	<1	97	9.9	11	142	5.08	190	115	10	7	97
SW128	**27/06/2023**	**0083_QC108_230627**	**Field Duplicate**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01													
SW128	**27/06/2023**	**0083_QC208_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.01	<0.06	<0.1													
SW128	**27/06/2023**	**0083_SW128_230627**	**Normal**	**EP2308616**	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	179	<1	179	3,940	3,930	129,000	0.12	14,200	979	6,590	1,920	75,600

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
* Practical screening value of 0.01 µg/L adopted based on current laboratory limit of reporting (HEPA, 2020)
First-time detection of PFOA or PFOS+PFHxS
New exceedance of guideline value

						Sample Preparation	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids						
						Moisture Content	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
						%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting						0.1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**															
SD113	**27/06/2023**	**0083_SD113_230627**	**Normal**	**EP2308622**		13.8	<0.0002	<0.0002	0.0003	<0.0002	0.0038	<0.0002	<0.001	0.0007	0.0005	0.0002	0.0002	<0.0002	<0.0002
SD126	**27/06/2023**	**0083_SD126_230627**	**Normal**	**EP2308615**		29.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD127	**27/06/2023**	**0083_SD127_230627**	**Normal**	**EP2308615**		13.5	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD128	**27/06/2023**	**0083_QC109_230627**	**Field Duplicate**	**EP2308615**		20.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD128	**27/06/2023**	**0083_QC209_230627**	**Interlab Duplicate**	**1004390**		27	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD128	**27/06/2023**	**0083_SD128_230627**	**Normal**	**EP2308615**		20.6	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD131	**27/06/2023**	**0083_SD131_230627**	**Normal**	**EP2308615**		12.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SS121	**27/06/2023**	**0083_SD121_230627**	**Normal**	**EP2308615**		17.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Note:

First-time detection of PFOA or PFOS+PFHxS

				Sample Preparation					PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides				
				Moisture Content	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting				0.1	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**													
SD113	**27/06/2023**	**0083_SD113_230627**	**Normal**	**EP2308622**	13.8	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	0.0064	0.0116	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005
SD126	**27/06/2023**	**0083_SD126_230627**	**Normal**	**EP2308615**	29.6	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005
SD127	**27/06/2023**	**0083_SD127_230627**	**Normal**	**EP2308615**	13.5	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005
SD128	**27/06/2023**	**0083_QC109_230627**	**Field Duplicate**	**EP2308615**	20.3	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005
SD128	**27/06/2023**	**0083_QC209_230627**	**Interlab Duplicate**	**1004390**	27	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005
SD128	**27/06/2023**	**0083_SD128_230627**	**Normal**	**EP2308615**	20.6	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005
SD131	**27/06/2023**	**0083_SD131_230627**	**Normal**	**EP2308615**	12.6	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005
SS121	**27/06/2023**	**0083_SD121_230627**	**Normal**	**EP2308615**	17.3	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005

Note:

First-time detection of PFOA or PFOS+PFHxS

					Sample Preparation			PFAS		
					Moisture Content	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting					0.1	0.0002	0.0005	0.0002	0.0002	0.0002
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**						
SD113	**27/06/2023**	**0083_SD113_230627**	**Normal**	**EP2308622**	13.8	<0.0002	<0.0005	0.0041	0.0237	0.0237
SD126	**27/06/2023**	**0083_SD126_230627**	**Normal**	**EP2308615**	29.6	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD127	**27/06/2023**	**0083_SD127_230627**	**Normal**	**EP2308615**	13.5	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD128	**27/06/2023**	**0083_QC109_230627**	**Field Duplicate**	**EP2308615**	20.3	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD128	**27/06/2023**	**0083_QC209_230627**	**Interlab Duplicate**	**1004390**	27	<0.01	<0.005	<0.005	<0.01	<0.05
SD128	**27/06/2023**	**0083_SD128_230627**	**Normal**	**EP2308615**	20.6	<0.0002	<0.0005	0.0003	0.0003	0.0003
SD131	**27/06/2023**	**0083_SD131_230627**	**Normal**	**EP2308615**	12.6	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS121	**27/06/2023**	**0083_SD121_230627**	**Normal**	**EP2308615**	17.3	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

Note:
First-time detection of PFOA or PFOS+PFHxS

		Date	27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023	
		Field ID	0083_SW128_230627	0083_QC108_230627		0083_SW128_230627	0083_QC208_230627		0083_MW114_4.5-5.0_230627	0083_QC110_230627		0083_MW114_4.5-5.0_230627	0083_QC210_230627	
		Matrix Type	Water	Water		Water	Water		Water	Water		Water	Water	
		Lab Report Number	EP2308616	EP2308616	RPD	EP2308616	1004390	RPD	EP2308611	EP2308611	RPD	EP2308611	1004390	RPD
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.06	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.06	0	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***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

Date			27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023	
Field ID			0083_MW027_230627	0083_QC111_230627		0083_MW027_230627	0083_QC211_230627		0083_MW213_230627	0083_QC112_230627		0083_MW213_230627	0083_QC212_230627		0083_MW019_230627	0083_QC113_230627	
Matrix Type			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Lab Report Number	Unit	LOR	EP2308621	EP2308621	RPD	EP2308621	1004390	RPD	EP2308621	EP2308621	RPD	EP2308621	1004390	RPD	EP2308621	EP2308621	RPD
PFAS - Perfluoroalkyl Sulfonic Acids																	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.08	0.03	91	0.08	0.05	46	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.08	0.02	120	0.08	0.02	120	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	1.62	0.63	**88**	1.62	0.55	**99**	<0.01	<0.01	0	<0.01	<0.01	0	0.05	0.05	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	0.03	<0.02	40	0.03	<0.01	100	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.41	0.21	**65**	0.41	0.18	**78**	<0.01	<0.01	0	<0.01	<0.01	0	0.01	0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Perfluoroalkyl Carboxylic Acids																	
Perfluorobutanoic acid (PFBA)	µg/L	0.05	0.2	<0.2	0	0.2	0.10	67	<0.1	<0.1	0	<0.1	<0.05	0	<0.3	<0.2	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.64	0.20	**105**	0.64	0.21	**101**	<0.02	<0.02	0	<0.02	<0.01	0	0.06	0.04	40
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.61	0.21	**98**	0.61	0.22	**94**	<0.02	<0.02	0	<0.02	<0.01	0	0.04	0.04	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.27	0.11	**84**	0.27	0.10	**92**	<0.02	<0.02	0	<0.02	<0.01	0	0.05	0.04	22
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.10	0.05	67	0.10	0.05	67	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	0.02	<0.02	0	0.02	0.01	67	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids																	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - Perfluoroalkyl Sulfonamides																	
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																	
Sum of PFHxS and PFOS	µg/L	0.01	2.03	0.84	**83**	2.03	0.73	**94**	<0.01	<0.01	0	<0.01	<0.01	0	0.06	0.06	0
Sum of PFAS (WA DER List)	µg/L	0.01	3.93	1.44	**93**	3.93	1.46	**92**	<0.01	<0.01	0	<0.01	<0.05	0	0.21	0.18	15
Sum of PFAS	µg/L	0.01	4.06	1.46	**94**	4.06	1.51	**92**	<0.01	<0.01	0	<0.01	<0.1	0	0.21	0.18	15

			Date	27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023	
			Field ID	0083_MW019_230627	0083_QC213_230627		0083_MW017_230627	0083_QC114_230627		0083_MW017_230627	0083_QC214_230627	
			Matrix Type	Water	Water		Water	Water		Water	Water	
			Lab Report Number	EP2308621	1004390	RPD	EP2308621	EP2308621	RPD	EP2308621	1004390	RPD
	Unit	LOR										
PFAS - Perfluoroalkyl Sulfonic Acids												
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01		<0.02	<0.01	0	0.05	0.08	46	0.05	0.06	18
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01		<0.02	<0.01	0	0.05	0.11	75	0.05	0.16	**105**
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01		0.05	0.04	22	1.20	4.46	**115**	1.20	4.1	**109**
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01		<0.02	<0.01	0	0.11	0.06	59	0.11	0.08	32
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01		0.01	0.01	0	13.9	5.05	**93**	13.9	4.9	**96**
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.05		<0.3	<0.05	0	1.1	4.6	**123**	1.1	3.9	**112**
Perfluoropentanoic acid (PFPeA)	µg/L	0.01		0.06	0.04	40	3.24	9.92	**102**	3.24	12	**115**
Perfluorohexanoic acid (PFHxA)	µg/L	0.01		0.04	0.02	67	3.34	11.5	**110**	3.34	14	**123**
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01		0.05	0.01	133	2.10	8.23	**119**	2.10	8.6	**121**
Perfluorooctanoic acid (PFOA)	µg/L	0.01		<0.01	<0.01	0	0.68	2.35	**110**	0.68	2.2	**106**
Perfluorononanoic acid (PFNA)	µg/L	0.01		<0.02	<0.01	0	0.05	0.06	18	0.05	0.05	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01		<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01		<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05		<0.05	<0.05	0	2.36	4.63	**65**	2.36	6.4	**92**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01		<0.05	<0.01	0	0.28	0.49	55	0.28	0.32	13
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01		<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02		<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05		<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02		<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05		<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05		<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02		<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05		<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS												
Sum of PFHxS and PFOS	µg/L	0.01		0.06	0.05	18	15.1	9.51	**45**	15.1	9	**51**
Sum of PFAS (WA DER List)	µg/L	0.01		0.21	0.12	**55**	28.2	51.3	**58**	28.2	56.48	**67**
Sum of PFAS	µg/L	0.01		0.21	0.12	**55**	28.5	51.5	**57**	28.5	56.8	**66**

			Date	27 Jun 2023	27 Jun 2023		27 Jun 2023	27 Jun 2023	
			Field ID	0083_SD128_230627	0083_QC109_230627		0083_SD128_230627	0083_QC209_230627	
			Matrix Type	Soil	Soil		Soil	Soil	
			Lab Report Number	EP2308615	EP2308615	RPD	EP2308615	1004390	RPD
	Unit	LOR							
PFAS - Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0003	<0.0002	40	0.0003	<0.005	0
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS									
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0003	<0.0002	40	0.0003	<0.005	0
Sum of PFAS (WA DER List)	mg/kg	0.0002	0.0003	<0.0002	40	0.0003	<0.01	0
Sum of PFAS	mg/kg	0.0002	0.0003	<0.0002	40	0.0003	<0.05	0

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

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))

***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

C

LABORATORY CERTIFICATES

Cardno

now

Stantec

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2308611

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0083-PFASOTP-23 Client: STANTEC Project Manager: [redacted]

54002 54001 54000 53947 53946 ~~53949~~ Phone: ( )

ALS Compass COC Reference: 53948 # Samples: ~~5~~ ~~6~~ Sampler:

54004 54005 Phone: ( )

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 28/06/23	Date / Time: 29/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **54004** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW116_4.5-5		27/06/2023 07:47 AM	WATER	ALS: 3 Non ALS: 0	No	X		
002	0083_MW117_4.0-4.5		27/06/2023 09:06 AM	WATER	ALS: 5 Non ALS: 0	No	X		
003	0083_MW115_2.0-3.0		27/06/2023 09:30 AM	WATER	ALS: 3 Non ALS: 0	No	X		
004	0083_MW114_4.5-5.0		27/06/2023 10:15 AM	WATER	ALS: 3 Non ALS: 0	No	X		
005	0083_MW113_2.5-3.5		27/06/2023 10:57 AM	WATER	ALS: 3 Non ALS: 0	No	X		
006	0083_QC110		27/06/2023 10:19 AM	WATER	ALS: 3 Non ALS: 0	No	X		
007	0083_MW202		27/06/2023 02:06 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CHAIN OF CUSTODY

(ALS) COC#: 54004 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW116_4.5-5	Clear Plastic Bottle - Natural	125 mL	00071121129664	Green	No	
001	0083_MW116_4.5-5	HDPE (no PTFE)	20 mL	00350822082139	Grey	No	
001	0083_MW116_4.5-5	HDPE (no PTFE)	20 mL	00350822082147	Grey	No	
002	0083_MW117_4.0-4.5	HDPE (no PTFE)	20 mL	00350822082187	Grey	No	
002	0083_MW117_4.0-4.5	Clear Plastic Bottle - Natural	125 mL	00071121129702	Green	No	
002	0083_MW117_4.0-4.5	HDPE (no PTFE)	20 mL	00350822082045	Grey	No	
002	0083_MW117_4.0-4.5	HDPE (no PTFE)	20 mL	00350822082188	Grey	No	
002	0083_MW117_4.0-4.5	HDPE (no PTFE)	20 mL	00350822082207	Grey	No	
003	0083_MW115_2.0-3.0	Clear Plastic Bottle - Natural	125 mL	00071121129649	Green	No	
003	0083_MW115_2.0-3.0	HDPE (no PTFE)	20 mL	00350822082175	Grey	No	
003	0083_MW115_2.0-3.0	HDPE (no PTFE)	20 mL	00350822082209	Grey	No	
004	0083_MW114_4.5-5.0	Clear Plastic Bottle - Natural	125 mL	00071121129674	Green	No	
004	0083_MW114_4.5-5.0	HDPE (no PTFE)	20 mL	00350822082275	Grey	No	
004	0083_MW114_4.5-5.0	HDPE (no PTFE)	20 mL	00350822082018	Grey	No	
005	0083_MW113_2.5-3.5	Clear Plastic Bottle - Natural	125 mL	00071121129712	Green	No	
005	0083_MW113_2.5-3.5	HDPE (no PTFE)	20 mL	00350822082279	Grey	No	
005	0083_MW113_2.5-3.5	HDPE (no PTFE)	20 mL	00350822082073	Grey	No	
006	0083_QC110	Clear Plastic Bottle - Natural	125 mL	00071121129628	Green	No	
006	0083_QC110	HDPE (no PTFE)	20 mL	00350822082287	Grey	No	
006	0083_QC110	HDPE (no PTFE)	20 mL	00350822082096	Grey	No	
007	0083_MW202	HDPE (no PTFE)	20 mL	00350821001929	Grey	No	
007	0083_MW202	HDPE (no PTFE)	20 mL	00350821001909	Grey	No	
007	0083_MW202	Clear Plastic Bottle - Natural	125 mL	00070522145051	Green	No	

Total Bottle Count: ALS: 23, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308611**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 54004	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2308611-001	: 27-Jun-2023 07:47	: 0083_MW116_4.5-5_230627
EP2308611-002	: 27-Jun-2023 09:06	: 0083_MW117_4.0-4.5_230627
EP2308611-003	: 27-Jun-2023 09:30	: 0083_MW115_2.0-3.0_230627
EP2308611-004	: 27-Jun-2023 10:15	: 0083_MW114_4.5-5.0_230627
EP2308611-005	: 27-Jun-2023 10:57	: 0083_MW113_2.5-3.5_230627

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	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308611-001	27-Jun-2023 07:47	0083_MW116_4.5-5_230...	✓	✓
EP2308611-002	27-Jun-2023 09:06	0083_MW117_4.0-4.5_2...	✓	✓
EP2308611-003	27-Jun-2023 09:30	0083_MW115_2.0-3.0_2...	✓	✓
EP2308611-004	27-Jun-2023 10:15	0083_MW114_4.5-5.0_2...	✓	✓
EP2308611-005	27-Jun-2023 10:57	0083_MW113_2.5-3.5_2...	✓	✓
EP2308611-006	27-Jun-2023 10:19	0083_QC110_230627	✓	✓
EP2308611-007	27-Jun-2023 14:06	0083_MW202_230627	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308611**	Page	: 1 of 9
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54004	Issue Date	: 11-Jul-2023 21:30
Sampler	: [redacted]		
Site	: HEHA GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW116_4.5-5_230627	0083_MW117_4.0-4.5_230627	0083_MW115_2.0-3.0_230627	0083_MW114_4.5-5.0_230627	0083_MW113_2.5-3.5_230627
				Sampling date / time	27-Jun-2023 07:47	27-Jun-2023 09:06	27-Jun-2023 09:30	27-Jun-2023 10:15	27-Jun-2023 10:57
Compound	CAS Number	LOR	Unit		EP2308611-001	EP2308611-002	EP2308611-003	EP2308611-004	EP2308611-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**112**	**145**	**183**	**548**	**951**
Total Alkalinity as CaCO3	----	1	mg/L		**112**	**145**	**183**	**548**	**951**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2310**	**210**	**2340**	**2580**	**1890**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**15300**	**2060**	**16400**	**17500**	**12500**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**414**	**115**	**433**	**462**	**346**
Magnesium	7439-95-4	1	mg/L		**1300**	**118**	**1370**	**1460**	**1100**
Sodium	7440-23-5	1	mg/L		**9980**	**1210**	**10600**	**11300**	**8500**
Potassium	7440-09-7	1	mg/L		**548**	**91**	**550**	**598**	**446**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**482**	**65.4**	**515**	**558**	**411**
ø Total Cations	----	0.01	meq/L		**576**	**70.4**	**610**	**650**	**489**
ø Ionic Balance	----	0.01	%		**8.87**	**3.70**	**8.40**	**7.59**	**8.66**
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	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW116_4.5-5_230627	0083_MW117_4.0-4.5_230627	0083_MW115_2.0-3.0_230627	0083_MW114_4.5-5.0_230627	0083_MW113_2.5-3.5_230627
				Sampling date / time	27-Jun-2023 07:47	27-Jun-2023 09:06	27-Jun-2023 09:30	27-Jun-2023 10:15	27-Jun-2023 10:57
Compound	CAS Number	LOR	Unit		EP2308611-001	EP2308611-002	EP2308611-003	EP2308611-004	EP2308611-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW116_4.5-5_230627	0083_MW117_4.0-4.5_230627	0083_MW115_2.0-3.0_230627	0083_MW114_4.5-5.0_230627	0083_MW113_2.5-3.5_230627
				Sampling date / time	27-Jun-2023 07:47	27-Jun-2023 09:06	27-Jun-2023 09:30	27-Jun-2023 10:15	27-Jun-2023 10:57
Compound	CAS Number	LOR	Unit		EP2308611-001	EP2308611-002	EP2308611-003	EP2308611-004	EP2308611-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**109**	**103**	**99.5**	**113**	**109**
13C8-PFOA	----	0.02	%		**95.4**	**98.9**	**101**	**97.9**	**97.5**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_QC110_230627	0083_MW202_230627	----	----	----
				Sampling date / time	27-Jun-2023 10:19	27-Jun-2023 14:06	----	----	----
Compound	CAS Number	LOR	Unit		EP2308611-006	EP2308611-007	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		435	210	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		435	210	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2540	1710	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17300	11700	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		456	291	----	----	----
Magnesium	7439-95-4	1	mg/L		1410	764	----	----	----
Sodium	7440-23-5	1	mg/L		10900	7060	----	----	----
Potassium	7440-09-7	1	mg/L		578	258	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		550	370	----	----	----
ø Total Cations	----	0.01	meq/L		628	391	----	----	----
ø Ionic Balance	----	0.01	%		6.64	2.79	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_QC110_230627	0083_MW202_230627	----	----	----
				Sampling date / time	27-Jun-2023 10:19	27-Jun-2023 14:06	----	----	----
Compound	CAS Number	LOR	Unit		EP2308611-006	EP2308611-007	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_QC110_230627	0083_MW202_230627	----	----	----
				Sampling date / time	27-Jun-2023 10:19	27-Jun-2023 14:06	----	----	----
Compound	CAS Number	LOR	Unit		EP2308611-006	EP2308611-007	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.8**	**106**	----	----	----
13C8-PFOA	----	0.02	%		**98.1**	**97.5**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EP2308611**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54004	Issue Date	: 11-Jul-2023
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5147604)									
EP2308611-002	0083_MW117_4.0-4.5_230627	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	144	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	144	0.9	0% - 20%
EP2308612-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	134	1.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	134	1.9	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148895)									
EP2308611-001	0083_MW116_4.5-5_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2310	2300	0.6	0% - 20%
EP2308702-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2310	2350	1.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148896)									
EP2308611-001	0083_MW116_4.5-5_230627	ED045G: Chloride	16887-00-6	1	mg/L	15300	15000	1.8	0% - 20%
EP2308702-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21800	21800	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5145416)									
EP2308611-001	0083_MW116_4.5-5_230627	ED093F: Calcium	7440-70-2	1	mg/L	414	414	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1320	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9980	10200	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	548	554	1.1	0% - 20%
EP2308612-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	459	467	1.8	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 5145416) - continued									
EP2308612-004	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	1450	1460	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11200	11400	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	589	596	1.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	0083_MW117_4.0-4.5_230627	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159181)									
EP2308611-002	0083_MW117_4.0-4.5_230627	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159181)									
EP2308611-002	0083_MW117_4.0-4.5_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159181)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159181) - continued									
EP2308611-002	0083_MW117_4.0-4.5_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159181)									
EP2308611-002	0083_MW117_4.0-4.5_230627	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5147604)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	96.0	87.8	118
				<1	200 mg/L	99.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.7	89.9	112
				<1	500 mg/L	92.6	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148896)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.5	88.6	113
				<1	1000 mg/L	95.2	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5145416)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159181)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	99.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	98.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	105	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159181)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	95.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159181) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159181)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	103	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	92.4	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	90.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159181)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	98.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	110	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	110	64.2	133
EP231P: PFAS Sums (QCLot: 5159181)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895)							
EP2308611-001	0083_MW116_4.5-5_230627						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895) - continued							
EP2308611-001	0083_MW116_4.5-5_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148896)							
EP2308611-001	0083_MW116_4.5-5_230627	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308611**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA GW - JS	Issue Date	: 11-Jul-2023
Sampler	: [redacted]	No. of samples received	: 7
Order number	: pfas-omp HEHA	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308611--001	0083_MW116_4.5-5_230627	**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	EP2308611--001	0083_MW116_4.5-5_230627	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0083_MW116_4.5-5_230627,	0083_MW117_4.0-4.5_230627,	----	----	----	05-Jul-2023	04-Jul-2023	**1**
0083_MW115_2.0-3.0_230627,	0083_MW114_4.5-5.0_230627,						
0083_MW113_2.5-3.5_230627,	0083_QC110_230627,						
0083_MW202_230627							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)	1				
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**----**	----	----	**03-Jul-2023**	11-Jul-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**----**	----	----	**08-Jul-2023**	25-Jul-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**----**	----	----	**10-Jul-2023**	25-Jul-2023	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**----**	----	----	**05-Jul-2023**	04-Jul-2023	×
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW116_4.5-5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW113_2.5-3.5_230627, 0083_MW202_230627, 0083_MW117_4.0-4.5_230627, 0083_MW114_4.5-5.0_230627, 0083_QC110_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW116_4.5-5_230627, 0083_MW117_4.0-4.5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW114_4.5-5.0_230627, 0083_MW113_2.5-3.5_230627, 0083_QC110_230627, 0083_MW202_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW116_4.5-5_230627, 0083_MW117_4.0-4.5_230627, 0083_MW115_2.0-3.0_230627, 0083_MW114_4.5-5.0_230627, 0083_MW113_2.5-3.5_230627, 0083_QC110_230627, 0083_MW202_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**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
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**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
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	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2308612
Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083-PFASOTTP-23 **Client:** STANTEC **Project Manager:** [redacted]

54002 54001 54000 53947 53946 ~~53945~~

ALS Compass COC Reference: 53948 **# Samples:** ~~53945~~ ~~53944~~ **Phone:** [redacted]

54004 54005 **Sampler:** [redacted]

Phone: [redacted]

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 28/06/23	Date / Time: 29/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 54005 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH107		27/06/2023 08:03 AM	WATER	ALS: 3 Non ALS: 0	No	X		
002	0083_OTH108		27/06/2023 09:10 AM	WATER	ALS: 3 Non ALS: 0	No	X		
003	0083_OTH106		27/06/2023 09:52 AM	WATER	ALS: 3 Non ALS: 0	No	X		
004	0083_OTH105		27/06/2023 11:12 AM	WATER	ALS: 3 Non ALS: 0	No	X		
005	0083_OTH109		27/06/2023 12:37 PM	WATER	ALS: 3 Non ALS: 0	No	X		
006	0083_OTH110		27/06/2023 12:56 PM	WATER	ALS: 5 Non ALS: 0	No	X		
007	0083_OTH101		27/06/2023 01:16 PM	WATER	ALS: 3 Non ALS: 0	No	X		
008	0083_OTH102		27/06/2023 01:49 PM	WATER	ALS: 5 Non ALS: 0	No	X		

CHAIN OF CUSTODY

COC#: **54005** *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH107	HDPE (no PTFE)	20 mL	00350822082135	Grey	No	
001	0083_OTH107	HDPE (no PTFE)	20 mL	00350822082121	Grey	No	
001	0083_OTH107	Clear Plastic Bottle - Natural	125 mL	00071121129689	Green	No	
002	0083_OTH108	HDPE (no PTFE)	20 mL	00350822000500	Grey	No	
002	0083_OTH108	HDPE (no PTFE)	20 mL	00350822000406	Grey	No	
002	0083_OTH108	Clear Plastic Bottle - Natural	125 mL	00071121129610	Green	No	
003	0083_OTH106	Clear Plastic Bottle - Natural	125 mL	00071121129676	Green	No	
003	0083_OTH106	HDPE (no PTFE)	20 mL	00350822082156	Grey	No	
003	0083_OTH106	HDPE (no PTFE)	20 mL	00350822082285	Grey	No	
004	0083_OTH105	Clear Plastic Bottle - Natural	125 mL	00071121129639	Green	No	
004	0083_OTH105	HDPE (no PTFE)	20 mL	00350822082165	Grey	No	
004	0083_OTH105	HDPE (no PTFE)	20 mL	00350822082223	Grey	No	
005	0083_OTH109	HDPE (no PTFE)	20 mL	00350821001755	Grey	No	
005	0083_OTH109	HDPE (no PTFE)	20 mL	00350821001801	Grey	No	
005	0083_OTH109	Clear Plastic Bottle - Natural	125 mL	00070522162831	Green	No	
006	0083_OTH110	HDPE (no PTFE)	20 mL	00350822082061	Grey	No	
006	0083_OTH110	HDPE (no PTFE)	20 mL	00350822082132	Grey	No	
006	0083_OTH110	HDPE (no PTFE)	20 mL	00350822000584	Grey	No	
006	0083_OTH110	HDPE (no PTFE)	20 mL	00350822000314	Grey	No	
006	0083_OTH110	Clear Plastic Bottle - Natural	125 mL	00071121129636	Green	No	
007	0083_OTH101	Clear Plastic Bottle - Natural	125 mL	00070522145157	Green	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350821001900	Grey	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350821001845	Grey	No	
008	0083_OTH102	HDPE (no PTFE)	20 mL	00350822000591	Grey	No	
008	0083_OTH102	HDPE (no PTFE)	20 mL	00350822000382	Grey	No	
008	0083_OTH102	HDPE (no PTFE)	20 mL	00350822000415	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 54005 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - JS

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

[redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

008	0083_OTH102	HDPE (no PTFE)	20 mL	00350822000420	Grey	No	
008	0083_OTH102	Clear Plastic Bottle - Natural	125 mL	00071121129685	Green	No	

Total Bottle Count: ALS: 28, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308612**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 54005	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
Receipt Detail	:	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
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308612-001	27-Jun-2023 08:03	0083_OTH107_230627	✓	✓
EP2308612-002	27-Jun-2023 09:10	0083_OTH108_230627	✓	✓
EP2308612-003	27-Jun-2023 09:52	0083_OTH106_230627	✓	✓
EP2308612-004	27-Jun-2023 11:12	0083_OTH105_230627	✓	✓
EP2308612-005	27-Jun-2023 12:37	0083_OTH109_230627	✓	✓
EP2308612-006	27-Jun-2023 12:56	0083_OTH110_230627	✓	✓
EP2308612-007	27-Jun-2023 13:16	0083_OTH101_230627	✓	✓
EP2308612-008	27-Jun-2023 13:49	0083_OTH102_230627	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308612**	Page	: 1 of 9
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54005	Issue Date	: 11-Jul-2023 16:54
Sampler	: [redacted]		
Site	: HEHA SW/OTH - JS		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER
(Matrix: WATER)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH107_230627	0083_OTH108_230627	0083_OTH106_230627	0083_OTH105_230627	0083_OTH109_230627
				Sampling date / time	27-Jun-2023 08:03	27-Jun-2023 09:10	27-Jun-2023 09:52	27-Jun-2023 11:12	27-Jun-2023 12:37
					EP2308612-001	EP2308612-002	EP2308612-003	EP2308612-004	EP2308612-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**125**	**155**	**271**	**131**	**123**
Total Alkalinity as CaCO3	----	1	mg/L		**125**	**155**	**271**	**131**	**123**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2640**	**2630**	**2730**	**2640**	**2540**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18800**	**18000**	**17700**	**17600**	**17400**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**468**	**466**	**467**	**459**	**446**
Magnesium	7439-95-4	1	mg/L		**1500**	**1480**	**1450**	**1450**	**1460**
Sodium	7440-23-5	1	mg/L		**11700**	**11500**	**11300**	**11200**	**11300**
Potassium	7440-09-7	1	mg/L		**615**	**601**	**590**	**589**	**598**
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**588**	**566**	**562**	**554**	**546**
ø **Total Cations**	----	0.01	meq/L		**671**	**661**	**649**	**644**	**649**
ø **Ionic Balance**	----	0.01	%		**6.64**	**7.75**	**7.24**	**7.54**	**8.62**
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	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH107_230627	0083_OTH108_230627	0083_OTH106_230627	0083_OTH105_230627	0083_OTH109_230627
				Sampling date / time	27-Jun-2023 08:03	27-Jun-2023 09:10	27-Jun-2023 09:52	27-Jun-2023 11:12	27-Jun-2023 12:37
Compound	CAS Number	LOR	Unit		EP2308612-001	EP2308612-002	EP2308612-003	EP2308612-004	EP2308612-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH107_230627	0083_OTH108_230627	0083_OTH106_230627	0083_OTH105_230627	0083_OTH109_230627
				Sampling date / time	27-Jun-2023 08:03	27-Jun-2023 09:10	27-Jun-2023 09:52	27-Jun-2023 11:12	27-Jun-2023 12:37
Compound	CAS Number	LOR	Unit		EP2308612-001	EP2308612-002	EP2308612-003	EP2308612-004	EP2308612-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**105**	**106**	**99.3**	**96.7**
13C8-PFOA	----	0.02	%		**104**	**106**	**97.8**	**101**	**103**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH110_230627	0083_OTH101_230627	0083_OTH102_230627	----	----
				Sampling date / time	27-Jun-2023 12:56	27-Jun-2023 13:16	27-Jun-2023 13:49	----	----
Compound	CAS Number	LOR	Unit		EP2308612-006	EP2308612-007	EP2308612-008	--------	--------
					Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		118	121	126	----	----
Total Alkalinity as CaCO3	----	1	mg/L		118	121	126	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2540	2560	2560	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17300	17400	17200	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		445	454	453	----	----
Magnesium	7439-95-4	1	mg/L		1430	1460	1460	----	----
Sodium	7440-23-5	1	mg/L		11100	11300	11300	----	----
Potassium	7440-09-7	1	mg/L		584	594	595	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		543	546	541	----	----
ø Total Cations	----	0.01	meq/L		638	650	650	----	----
ø Ionic Balance	----	0.01	%		7.99	8.61	9.11	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH110_230627	0083_OTH101_230627	0083_OTH102_230627	----	----
				Sampling date / time	27-Jun-2023 12:56	27-Jun-2023 13:16	27-Jun-2023 13:49	----	----
Compound	CAS Number	LOR	Unit		EP2308612-006	EP2308612-007	EP2308612-008	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH110_230627	0083_OTH101_230627	0083_OTH102_230627	----	----
				Sampling date / time	27-Jun-2023 12:56	27-Jun-2023 13:16	27-Jun-2023 13:49	----	----
Compound	CAS Number	LOR	Unit		EP2308612-006	EP2308612-007	EP2308612-008	--------	--------
					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		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.9**	**99.0**	**103**	----	----
13C8-PFOA	----	0.02	%		**101**	**103**	**101**	----	----

Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EP2308612**	Page	: 1 of 11
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54005	Issue Date	: 11-Jul-2023
Sampler	: [redacted]		
Site	: HEHA SW/OTH - JS		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 5147604)									
EP2308611-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	144	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	144	0.9	0% - 20%
EP2308612-004	0083_OTH105_230627	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	134	1.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	134	1.9	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148887)									
EP2308612-001	0083_OTH107_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2640	2550	3.3	0% - 20%
EP2308890-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1710	1700	0.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148888)									
EP2308612-001	0083_OTH107_230627	ED045G: Chloride	16887-00-6	1	mg/L	18800	18400	2.4	0% - 20%
EP2308890-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 5145416)									
EP2308611-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	414	414	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1320	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9980	10200	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	548	554	1.1	0% - 20%
EP2308612-004	0083_OTH105_230627	ED093F: Calcium	7440-70-2	1	mg/L	459	467	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1450	1460	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11200	11400	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	589	596	1.1	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159175)									
EP2308612-006	0083_OTH110_230627	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308616-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159175)									
EP2308612-006	0083_OTH110_230627	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308616-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159175) - continued									
EP2308616-001	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159175)									
EP2308612-006	0083_OTH110_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308616-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159175)									
EP2308612-006	0083_OTH110_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308616-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159175)									
EP2308612-006	0083_OTH110_230627	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 5159175) - continued									
EP2308612-006	0083_OTH110_230627	EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2308616-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5147604)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	96.0	87.8	118
				<1	200 mg/L	99.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148887)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	89.9	112
				<1	500 mg/L	98.4	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148888)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	88.6	113
				<1	1000 mg/L	96.4	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5145416)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159175)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	95.1	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	93.1	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	91.5	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159181)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	99.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	98.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	105	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	102	53.0	142

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159175)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	85.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	98.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	107	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159181)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	95.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159175)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	111	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	95.1	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	108	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.6	61.0	135

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159181)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	103	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	92.4	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	90.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159175)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	97.7	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	104	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	106	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	99.4	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159181)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	98.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	110	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	110	64.2	133
EP231P: PFAS Sums (QCLot: 5159175)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159181)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148887)							
EP2308612-001	0083_OTH107_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148888)							
EP2308612-001	0083_OTH107_230627	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159175)							
EP2308612-008	0083_OTH102_230627	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	93.7	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	101	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	103	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	105	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	96.1	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	100	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159175)							
EP2308612-008	0083_OTH102_230627	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	109	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	106	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	103	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	100.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	94.2	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	105	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159175)							
EP2308612-008	0083_OTH102_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	117	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	119	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	111	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	108	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	104	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159175)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159175) - continued							
EP2308612-008	0083_OTH102_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	120	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	118	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	110	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308612**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA SW/OTH - JS	Issue Date	: 11-Jul-2023
Sampler	: [redacted]	No. of samples received	: 8
Order number	: pfas-omp HEHA	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

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308612--001	0083_OTH107_230627	**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	EP2308612--001	0083_OTH107_230627	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0083_OTH107_230627,	0083_OTH108_230627,	----	----	----	05-Jul-2023	04-Jul-2023	**1**
0083_OTH106_230627,	0083_OTH105_230627,						
0083_OTH109_230627,	0083_OTH110_230627,						
0083_OTH101_230627,	0083_OTH102_230627						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
	1				
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	30	3.33	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH106_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**----**	----	**----**	**03-Jul-2023**	11-Jul-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH106_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**----**	----	**----**	**05-Jul-2023**	25-Jul-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH106_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**----**	----	**----**	**05-Jul-2023**	25-Jul-2023	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH106_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**----**	----	**----**	**05-Jul-2023**	04-Jul-2023	×
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH106_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH106_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

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) 0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0083_OTH106_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0083_OTH106_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0083_OTH107_230627, 0083_OTH108_230627, 0083_OTH105_230627, 0083_OTH109_230627, 0083_OTH110_230627, 0083_OTH101_230627, 0083_OTH102_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0083_OTH106_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	11	**18.18**	**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	3	30	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	11	**18.18**	**10.00**	✓	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	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	11	**9.09**	**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	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	30	**3.33**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2308615

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083 - PFASOTIP_23 **Client:** STANTEC

54002 54001 54000 53947 53946

ALS Compass COC Reference: 53948 **# Samples:**

54004 54005

Project Manager: [redacted]
Phone: ( )

Sampler:
Phone: ( )

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 28/06/23	Date / Time: 2/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 53946 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD128		27/06/2023 08:15 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0083_QC109		27/06/2023 08:16 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0083_SD127		27/06/2023 08:39 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0083_SD131		27/06/2023 08:45 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0083_SD126		27/06/2023 08:55 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
6	0083_SD121						X		

Tuesday, June 27, 2023 8:45:06 AM

CHAIN OF CUSTODY

ALS COC#: 53946 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD128	HDPE Soil Jar	200 mL	00621222067093	Grey	No	
002	0083_QC109	HDPE Soil Jar	200 mL	00621222067063	Grey	No	
003	0083_SD127	HDPE Soil Jar	200 mL	00621222067077	Grey	No	
004	0083_SD131	HDPE Soil Jar	200 mL	00621222067103	Grey	No	
005	0083_SD126	HDPE Soil Jar	200 mL	00621222067106	Grey	No	

Total Bottle Count: ALS: 5, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308615**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 53946	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2308615-001	27-Jun-2023 08:15	0083_SD128_230627	✓	✓
EP2308615-002	27-Jun-2023 08:16	0083_QC109_230627	✓	✓
EP2308615-003	27-Jun-2023 08:39	0083_SD127_230627	✓	✓
EP2308615-004	27-Jun-2023 08:45	0083_SD131_230627	✓	✓
EP2308615-005	27-Jun-2023 08:55	0083_SD126_230627	✓	✓
EP2308615-006	27-Jun-2023 08:55	0083_SD121_230627	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308615**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 06-Jul-2023
C-O-C number	: 53946	Issue Date	: 10-Jul-2023 16:14
Sampler	: [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 6		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD128_230627	0083_QC109_230627	0083_SD127_230627	0083_SD131_230627	0083_SD126_230627
				Sampling date / time	27-Jun-2023 08:15	27-Jun-2023 08:16	27-Jun-2023 08:39	27-Jun-2023 08:45	27-Jun-2023 08:55
Compound	CAS Number	LOR	Unit		EP2308615-001	EP2308615-002	EP2308615-003	EP2308615-004	EP2308615-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**20.6**	**20.3**	**13.5**	**12.6**	**29.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD128_230627	0083_QC109_230627	0083_SD127_230627	0083_SD131_230627	0083_SD126_230627
				Sampling date / time	27-Jun-2023 08:15	27-Jun-2023 08:16	27-Jun-2023 08:39	27-Jun-2023 08:45	27-Jun-2023 08:55
Compound	CAS Number	LOR	Unit		EP2308615-001	EP2308615-002	EP2308615-003	EP2308615-004	EP2308615-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**129**	**131**	**106**	**102**	**123**
13C8-PFOA	----	0.0002	%		**102**	**110**	**102**	**100**	**100**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD121_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 08:55	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308615-006	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		17.3	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD121_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 08:55	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308615-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**110**	----	----	----	----
13C8-PFOA	----	0.0002	%		**102**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131

QUALITY CONTROL REPORT

Work Order	: **EP2308615**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 06-Jul-2023
C-O-C number	: 53946	Issue Date	: 10-Jul-2023
Sampler	: [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 6		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5156795)									
EP2308615-001	0083_SD128_230627	EA055: Moisture Content	----	0.1	%	20.6	22.2	7.6	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5152739)									
EP2308615-001	0083_SD128_230627	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	47.6	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308752-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0014	0.0015	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0200	0.0191	4.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5152739)									
EP2308615-001	0083_SD128_230627	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5152739) - continued									
EP2308615-001	0083_SD128_230627	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2308752-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0007	0.0006	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0008	0.0008	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5152739)									
EP2308615-001	0083_SD128_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308752-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5152739)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5152739) - continued									
EP2308615-001	0083_SD128_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308752-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5152739)									
EP2308615-001	0083_SD128_230627	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
EP2308752-002	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0237	0.0228	3.9	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0214	0.0206	3.8	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0237	0.0228	3.9	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5152739)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	104	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	102	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	110	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	102	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5152739)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	105	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5152739)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	104	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.7	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5152739)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5152739) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	114	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	104	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	108	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	90.4	54.8	124
EP231P: PFAS Sums (QCLot: 5152739)								
EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5152739)							
EP2308615-002	0083_QC109_230627	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	110	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	117	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	104	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	115	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	120	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	125	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5152739)							
EP2308615-002	0083_QC109_230627	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	116	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	111	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	93.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	95.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	103	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	118	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.0	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	102	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	85.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	79.3	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	114	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5152739)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5152739) - continued							
EP2308615-002	0083_QC109_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	73.6	48.0	128
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	114	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	94.0	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	112	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	103	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	90.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5152739)							
EP2308615-002	0083_QC109_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	126	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	109	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	117	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	114	60.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308615**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA SD - MB	Issue Date	: 10-Jul-2023
Sampler	: [redacted]	No. of samples received	: 6
Order number	: pfas-omp HEHA	No. of samples analysed	: 6

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / 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)							
0083_SD128_230627, 0083_QC109_230627, 0083_SD127_230627, 0083_SD131_230627, 0083_SD126_230627, 0083_SD121_230627	**27-Jun-2023**	**----**	----	----	**06-Jul-2023**	11-Jul-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD128_230627, 0083_QC109_230627, 0083_SD127_230627, 0083_SD131_230627, 0083_SD126_230627, 0083_SD121_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD128_230627, 0083_QC109_230627, 0083_SD127_230627, 0083_SD131_230627, 0083_SD126_230627, 0083_SD121_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD128_230627, 0083_QC109_230627, 0083_SD127_230627, 0083_SD131_230627, 0083_SD126_230627, 0083_SD121_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD128_230627, 0083_QC109_230627, 0083_SD127_230627, 0083_SD131_230627, 0083_SD126_230627, 0083_SD121_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD128_230627, 0083_QC109_230627, 0083_SD127_230627, 0083_SD131_230627, 0083_SD126_230627, 0083_SD121_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
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 Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
QuECheRS Extraction of Solids	* ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2308616

Phone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083_PFASOTP_23 Client: STANTEC

Project Manager: [redacted]

Phone: ( )

54002 54001 54000 ~~53947~~ 53946

ALS Compass COC Reference: 53948 # Samples:

Sampler:

Phone: ( )

54004 54005

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 28/06/23	Date / Time: 2/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 53947 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SW128		27/06/2023 08:28 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra PFAS bottles for lab QC
002	0083_QC108		27/06/2023 08:30 AM	WATER	ALS: 2 Non ALS: 0	No	X			
003	0083_OTH103		27/06/2023 01:34 PM	WATER	ALS: 3 Non ALS: 0	No		X		
004	0083_QC301		27/06/2023 03:20 PM	WATER	ALS: 2 Non ALS: 0	No	X			
005	0083_QC302		27/06/2023 03:20 PM	WATER	ALS: 2 Non ALS: 0	No	X			
006	0083_QC303		27/06/2023 03:19 PM	WATER	ALS: 2 Non ALS: 0	No	X			
007	0083_QC401		27/06/2023 03:19 PM	WATER	ALS: 2 Non ALS: 0	No	X			
008	0083_QC402		27/06/2023 03:18 PM	WATER	ALS: 2 Non ALS: 0	No	X			
009	0083_QC403		27/06/2023 03:18 PM	WATER	ALS: 2 Non ALS: 0	No	X			

CHAIN OF CUSTODY

ALS COC#: 53947 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SW128	HDPE (no PTFE)	20 mL	00352101070786	Grey	No	
001	0083_SW128	HDPE (no PTFE)	20 mL	00350621067291	Grey	No	
001	0083_SW128	HDPE (no PTFE)	20 mL	00350822082149	Grey	No	
001	0083_SW128	HDPE (no PTFE)	20 mL	00350822082242	Grey	No	
002	0083_QC108	Clear Plastic Bottle - Natural	125 mL	00071121130188	Green	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00350822082102	Grey	No	
003	0083_OTH103	HDPE (no PTFE)	20 mL	00350822082071	Grey	No	
003	0083_OTH103	HDPE (no PTFE)	20 mL	00350822000375	Grey	No	
003	0083_OTH103	HDPE (no PTFE)	20 mL	00350822000352	Grey	No	
004	0083_QC301	Clear Plastic Bottle - Natural	125 mL	00071121129624	Green	No	
004	0083_QC301	HDPE (no PTFE)	20 mL	00350822000607	Grey	No	
005	0083_QC302	HDPE (no PTFE)	20 mL	00350822000536	Grey	No	
005	0083_QC302	HDPE (no PTFE)	20 mL	00350822000318	Grey	No	
006	0083_QC303	HDPE (no PTFE)	20 mL	00350822000534	Grey	No	
006	0083_QC303	HDPE (no PTFE)	20 mL	00350822000339	Grey	No	
007	0083_QC401	HDPE (no PTFE)	20 mL	00350822000611	Grey	No	
007	0083_QC401	HDPE (no PTFE)	20 mL	00350822000458	Grey	No	
008	0083_QC402	HDPE (no PTFE)	20 mL	00350822000419	Grey	No	
008	0083_QC402	HDPE (no PTFE)	20 mL	00350822000423	Grey	No	
009	0083_QC403	HDPE (no PTFE)	20 mL	00350822000390	Grey	No	
009	0083_QC403	HDPE (no PTFE)	20 mL	00350822000502	Grey	No	
		HDPE (no PTFE)	20 mL	00350822000599	Grey	No	

Total Bottle Count: ALS: 22, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308616**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 53947	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

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 see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308616-001	27-Jun-2023 08:28	0083_SW128_230627	✓	✓
EP2308616-002	27-Jun-2023 08:30	0083_QC108_230627	✓	
EP2308616-003	27-Jun-2023 13:34	0083_OTH103_230627	✓	✓
EP2308616-004	27-Jun-2023 15:20	0083_QC301_230627	✓	
EP2308616-005	27-Jun-2023 15:20	0083_QC302_230627	✓	
EP2308616-006	27-Jun-2023 15:19	0083_QC303_230627	✓	
EP2308616-007	27-Jun-2023 15:19	0083_QC401_230627	✓	
EP2308616-008	27-Jun-2023 15:18	0083_QC402_230627	✓	
EP2308616-009	27-Jun-2023 15:18	0083_QC403_230627	✓	

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308616**	Page	: 1 of 13
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 53947	Issue Date	: 11-Jul-2023 22:39
Sampler	: [redacted]		
Site	: HEHA SW/OTH - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 9		
No. of samples analysed	: 9		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH103_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 13:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-003	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**121**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**121**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2560**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17900**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**407**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1150**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**10200**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**367**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**561**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**568**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**0.65**	----	----	----	----
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	0.01	µg/L		<0.01	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH103_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 13:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-003	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH103_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 13:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-003	--------	--------	--------	--------
					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	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	----	----	----	----
13C8-PFOA	----	0.02	%		**94.4**	----	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_230627	0083_QC302_230627	0083_QC303_230627	0083_QC401_230627	0083_QC402_230627
				Sampling date / time	27-Jun-2023 15:20	27-Jun-2023 15:20	27-Jun-2023 15:19	27-Jun-2023 15:19	27-Jun-2023 15:18
Compound	CAS Number	LOR	Unit		EP2308616-004	EP2308616-005	EP2308616-006	EP2308616-007	EP2308616-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<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	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
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

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_230627	0083_QC302_230627	0083_QC303_230627	0083_QC401_230627	0083_QC402_230627
				Sampling date / time	27-Jun-2023 15:20	27-Jun-2023 15:20	27-Jun-2023 15:19	27-Jun-2023 15:19	27-Jun-2023 15:18
Compound	CAS Number	LOR	Unit		EP2308616-004	EP2308616-005	EP2308616-006	EP2308616-007	EP2308616-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**99.3**	**102**	**104**	**97.0**
13C8-PFOA	----	0.02	%		**106**	**98.8**	**102**	**103**	**106**

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC403_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 15:18	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-009	--------	--------	--------	--------
					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	0.01	µg/L		<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC403_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 15:18	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-009	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	%		**101**	----	----	----	----
13C8-PFOA	----	0.02	%		**103**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW128_230627	0083_QC108_230627	----	----	----
				Sampling date / time	27-Jun-2023 08:28	27-Jun-2023 08:30	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-001	EP2308616-002	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**179**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**179**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**14200**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**129000**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**979**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**6590**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**75600**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**1920**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**3940**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**3930**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**0.12**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW128_230627	0083_QC108_230627	----	----	----
				Sampling date / time	27-Jun-2023 08:28	27-Jun-2023 08:30	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-001	EP2308616-002	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW128_230627	0083_QC108_230627	----	----	----
				Sampling date / time	27-Jun-2023 08:28	27-Jun-2023 08:30	----	----	----
Compound	CAS Number	LOR	Unit		EP2308616-001	EP2308616-002	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**108**	**99.3**	----	----	----
13C8-PFOA	----	0.02	%		**105**	**99.4**	----	----	----

Surrogate Control Limits

Sub-Matrix: MARINE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

Sub-Matrix: RINSATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EP2308616**	Page	: 1 of 14
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 53947	Issue Date	: 11-Jul-2023
Sampler	: [redacted]		
Site	: HEHA SW/OTH - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 9		
No. of samples analysed	: 9		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 5147604)									
EP2308611-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	144	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	144	0.9	0% - 20%
EP2308612-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	134	1.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	134	1.9	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148893)									
EP2308616-001	0083_SW128_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14200	14300	0.9	0% - 20%
EP2308621-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	955	1010	5.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148894)									
EP2308616-001	0083_SW128_230627	ED045G: Chloride	16887-00-6	1	mg/L	129000	127000	1.7	0% - 20%
EP2308621-009	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	4620	4550	1.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5145416)									
EP2308611-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	414	414	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1320	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9980	10200	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	548	554	1.1	0% - 20%
EP2308612-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	459	467	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1450	1460	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11200	11400	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	589	596	1.1	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159175)									
EP2308612-006	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308616-001	0083_SW128_230627	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159175)									
EP2308612-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308616-001	0083_SW128_230627	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159175) - continued									
EP2308616-001	0083_SW128_230627	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.12	0.12	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159175)									
EP2308612-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159175) - continued									
EP2308612-006	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308616-001	0083_SW128_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159185) - continued									
EP2308617-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159175)									
EP2308612-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308616-001	0083_SW128_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159185) - continued									
EP2308617-007	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159175)									
EP2308612-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2308616-001	0083_SW128_230627	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.46	0.45	2.2	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.14	0.13	7.4	0% - 50%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.46	0.45	2.2	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5147604)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	96.0	87.8	118
				<1	200 mg/L	99.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148893)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	89.9	112
				<1	500 mg/L	92.0	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148894)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	88.6	113
				<1	1000 mg/L	95.3	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5145416)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159175)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	95.1	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	93.1	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	91.5	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159181)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	99.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	98.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	105	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	102	53.0	142

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	96.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	112	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	100	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159175)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	85.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	98.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	107	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159181)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	95.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.4	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185) - continued								
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	106	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	104	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159175)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	111	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	95.1	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	108	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159181)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	103	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	92.4	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	90.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	111	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	60.5	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	104	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	114	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159175)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	97.7	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	104	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	106	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	99.4	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159181)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	98.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	110	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	110	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159185)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	118	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	105	64.2	133
EP231P: PFAS Sums (QCLot: 5159175)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159181)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159185)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 5159185) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148893)							
EP2308616-001	0083_SW128_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148894)							
EP2308616-001	0083_SW128_230627	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159175)							
EP2308612-008	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	93.7	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	101	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	103	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	105	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	96.1	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	100	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	90.9	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	109	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	102	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	98.5	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	108	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159175)							
EP2308612-008	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	109	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	106	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	103	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	100.0	69.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159175) - continued							
EP2308612-008	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	94.2	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	105	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	103	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	110	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	110	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	92.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.5	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	106	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	98.1	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	99.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	104	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	102	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159175)							
EP2308612-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	117	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	119	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	111	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	108	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	104	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	117	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	96.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	107	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185) - continued							
EP2308621-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	109	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159175)							
EP2308612-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	120	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	118	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	110	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	109	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	103	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	106	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308616**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA SW/OTH - MB	Issue Date	: 11-Jul-2023
Sampler	: [redacted]	No. of samples received	: 9
Order number	: pfas-omp HEHA	No. of samples analysed	: 9

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **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	EP2308616--001	0083_SW128_230627	**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	EP2308616--001	0083_SW128_230627	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0083_SW128_230627,	0083_OTH103_230627	----	----	----	05-Jul-2023	04-Jul-2023	**1**

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: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_SW128_230627,	0083_OTH103_230627	**27-Jun-2023**	**----**	----	**----**	**03-Jul-2023**	11-Jul-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_SW128_230627,	0083_OTH103_230627	**27-Jun-2023**	**----**	----	**----**	**08-Jul-2023**	25-Jul-2023	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_SW128_230627		**27-Jun-2023**	**----**	----	**----**	**08-Jul-2023**	25-Jul-2023	✓
Clear Plastic Bottle - Natural (ED045G)								
0083_OTH103_230627		**27-Jun-2023**	**----**	----	**----**	**10-Jul-2023**	25-Jul-2023	✓

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)							
0083_SW128_230627, 0083_OTH103_230627	**27-Jun-2023**	**----**	----	**----**	**05-Jul-2023**	04-Jul-2023	×
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW128_230627, 0083_QC108_230627, 0083_QC301_230627, 0083_QC302_230627, 0083_QC303_230627, 0083_QC401_230627, 0083_QC402_230627, 0083_QC403_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH103_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW128_230627, 0083_QC108_230627, 0083_QC301_230627, 0083_QC302_230627, 0083_QC303_230627, 0083_QC401_230627, 0083_QC402_230627, 0083_QC403_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH103_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_SW128_230627, 0083_QC108_230627, 0083_QC301_230627, 0083_QC302_230627, 0083_QC303_230627, 0083_QC401_230627, 0083_QC402_230627, 0083_QC403_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH103_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW128_230627, 0083_QC108_230627, 0083_QC301_230627, 0083_QC302_230627, 0083_QC303_230627, 0083_QC401_230627, 0083_QC402_230627, 0083_QC403_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH103_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_SW128_230627, 0083_QC108_230627, 0083_QC301_230627, 0083_QC302_230627, 0083_QC303_230627, 0083_QC401_230627, 0083_QC402_230627, 0083_QC403_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_OTH103_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	39	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	39	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**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	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2308617

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083-PFASOTP_23 **Client:** STANTEC **Project Manager:** [redacted]

Phone: [redacted]

54002 54001 54000 53947 53946 [illegible]

ALS Compass COC Reference: 53948 **# Samples:** [illegible]

54004 54005

Sampler: [redacted]

Phone: [redacted]

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 28/06/23	Date / Time: 2/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: 53948 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS | **ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW129_1.5-2.0		27/06/2023 09:25 AM	WATER	ALS: 3 Non ALS: 0	No	X		
002	0083_OTH113		27/06/2023 09:48 AM	WATER	ALS: 3 Non ALS: 0	No	X		
003	0083_MW130_3.4-3.9		27/06/2023 10:05 AM	WATER	ALS: 3 Non ALS: 0	No	X	Njk	
004	0083_MW134		27/06/2023 10:25 AM	WATER	ALS: 3 Non ALS: 0	No	X		
005	0083_MW004		27/06/2023 11:04 AM	WATER	ALS: 3 Non ALS: 0	No	X		
006	0083_MW105_4.0-4.5		27/06/2023 11:20 AM	WATER	ALS: 3 Non ALS: 0	No	X		
007	0083_MW210		27/06/2023 11:31 AM	WATER	ALS: 5 Non ALS: 0	No	X		Extra PFAS bottles for lab QC
008	0083_MW212		27/06/2023 11:43 AM	WATER	ALS: 3 Non ALS: 0	No	X		
009	0083_MW119		27/06/2023 12:01 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CHAIN OF CUSTODY

COC#: 53948 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_OTH104		27/06/2023 12:33 PM	WATER	ALS: 3 Non ALS: 0	No	X		
011	0083_MW112_4.5-5.0		27/06/2023 12:56 PM	WATER	ALS: 3 Non ALS: 0	No	X		
012	0083_MW107_3.1-4.1		27/06/2023 01:18 PM	WATER	ALS: 3 Non ALS: 0	No	X		
013	0083_MW111_8.5-9.0		27/06/2023 01:57 PM	WATER	ALS: 3 Non ALS: 0	No	X		
014	0083_MW110_9.0-9.5		27/06/2023 02:27 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CHAIN OF CUSTODY

COC#: 53948 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW129_1.5-2.0	Clear Plastic Bottle - Natural	125 mL	00071121129655	Green	No	
001	0083_MW129_1.5-2.0	HDPE (no PTFE)	20 mL	00350822082264	Grey	No	
001	0083_MW129_1.5-2.0	HDPE (no PTFE)	20 mL	00350822082271	Grey	No	
002	0083_OTH113	HDPE (no PTFE)	20 mL	00350822082146	Grey	No	
002	0083_OTH113	HDPE (no PTFE)	20 mL	00350822082151	Grey	No	
002	0083_OTH113	Clear Plastic Bottle - Natural	125 mL	00071121129693	Green	No	
003	0083_MW130_3.4-3.9	Clear Plastic Bottle - Natural	125 mL	00071121129704	Green	No	
003	0083_MW130_3.4-3.9	HDPE (no PTFE)	20 mL	00350822082078	Grey	No	
003	0083_MW130_3.4-3.9	HDPE (no PTFE)	20 mL	00350822082258	Grey	No	
004	0083_MW134	HDPE (no PTFE)	20 mL	00350822082176	Grey	No	
004	0083_MW134	HDPE (no PTFE)	20 mL	00350822082104	Grey	No	
004	0083_MW134	Clear Plastic Bottle - Natural	125 mL	00071121129661	Green	No	
005	0083_MW004	Clear Plastic Bottle - Natural	125 mL	00071121129651	Green	No	
005	0083_MW004	HDPE (no PTFE)	20 mL	00350822000328	Grey	No	
005	0083_MW004	HDPE (no PTFE)	20 mL	00350822000531	Grey	No	
006	0083_MW105_4.0-4.5	Clear Plastic Bottle - Natural	125 mL	00071121129643	Green	No	
006	0083_MW105_4.0-4.5	HDPE (no PTFE)	20 mL	00350822082171	Grey	No	
006	0083_MW105_4.0-4.5	HDPE (no PTFE)	20 mL	00350822081997	Grey	No	
007	0083_MW210	HDPE (no PTFE)	20 mL	00350822000554	Grey	No	
007	0083_MW210	HDPE (no PTFE)	20 mL	00350019008226	Grey	No	
007	0083_MW210	HDPE (no PTFE)	20 mL	00352101058072	Grey	No	
007	0083_MW210	HDPE (no PTFE)	20 mL	00350822000567	Grey	No	
007	0083_MW210	Clear Plastic Bottle - Natural	125 mL	00071121129625	Green	No	
008	0083_MW212	HDPE (no PTFE)	20 mL	00350822000543	Grey	No	
008	0083_MW212	HDPE (no PTFE)	20 mL	00350822000539	Grey	No	
008	0083_MW212	Clear Plastic Bottle - Natural	125 mL	00071121129627	Green	No	

CHAIN OF CUSTODY

ALS COC#: 53948 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA .

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0083_MW119	HDPE (no PTFE)	20 mL	00350822000510	Grey	No	
009	0083_MW119	HDPE (no PTFE)	20 mL	00350822000490	Grey	No	
009	0083_MW119	Clear Plastic Bottle - Natural	125 mL	00071121129842	Green	No	
010	0083_OTH104	Clear Plastic Bottle - Natural	125 mL	00071121129623	Green	No	
010	0083_OTH104	HDPE (no PTFE)	20 mL	00350822000451	Grey	No	
010	0083_OTH104	HDPE (no PTFE)	20 mL	00350822000416	Grey	No	
011	0083_MW112_4.5-5.0	Clear Plastic Bottle - Natural	125 mL	00071121129630	Green	No	
011	0083_MW112_4.5-5.0	HDPE (no PTFE)	20 mL	00350822000395	Grey	No	
011	0083_MW112_4.5-5.0	HDPE (no PTFE)	20 mL	00350822000563	Grey	No	
012	0083_MW107_3.1-4.1	HDPE (no PTFE)	20 mL	00350822000465	Grey	No	
012	0083_MW107_3.1-4.1	HDPE (no PTFE)	20 mL	00350822000325	Grey	No	
012	0083_MW107_3.1-4.1	Clear Plastic Bottle - Natural	125 mL	00071121129791	Green	No	
013	0083_MW111_8.5-9.0	HDPE (no PTFE)	20 mL	00350822000509	Grey	No	
013	0083_MW111_8.5-9.0	HDPE (no PTFE)	20 mL	00350822000572	Grey	No	
013	0083_MW111_8.5-9.0	Clear Plastic Bottle - Natural	125 mL	00071121129708	Green	No	
014	0083_MW110_9.0-9.5	HDPE (no PTFE)	20 mL	00350822000384	Grey	No	
014	0083_MW110_9.0-9.5	HDPE (no PTFE)	20 mL	00350822000505	Grey	No	
014	0083_MW110_9.0-9.5	Clear Plastic Bottle - Natural	125 mL	00071121129636	Green	No	

Total Bottle Count: ALS: 44, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308617**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 3
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 53948	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 03-Jul-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

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 see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2308617-001	: 27-Jun-2023 09:25	: 0083_MW129_1.5-2.0_230627
EP2308617-003	: 27-Jun-2023 10:05	: 0083_MW130_3.4-3.9_230627
EP2308617-006	: 27-Jun-2023 11:20	: 0083_MW105_4.0-4.5_230627
EP2308617-011	: 27-Jun-2023 12:56	: 0083_MW112_4.5-5.0_230627
EP2308617-012	: 27-Jun-2023 13:18	: 0083_MW107_3.1-4.1_230627
EP2308617-013	: 27-Jun-2023 13:57	: 0083_MW111_8.5-9.0_230627
EP2308617-014	: 27-Jun-2023 14:27	: 0083_MW110_9.0-9.5_230627

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	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308617-001	27-Jun-2023 09:25	0083_MW129_1.5-2.0_2...	✓	✓
EP2308617-002	27-Jun-2023 09:48	0083_OTH113_230627	✓	✓
EP2308617-003	27-Jun-2023 10:05	0083_MW130_3.4-3.9_2...	✓	✓
EP2308617-004	27-Jun-2023 10:25	0083_MW134_230627	✓	✓
EP2308617-005	27-Jun-2023 11:04	0083_MW004_230627	✓	✓
EP2308617-006	27-Jun-2023 11:20	0083_MW105_4.0-4.5_2...	✓	✓
EP2308617-007	27-Jun-2023 11:31	0083_MW210_230627	✓	✓
EP2308617-008	27-Jun-2023 11:43	0083_MW212_230627	✓	✓
EP2308617-009	27-Jun-2023 12:01	0083_MW119_230627	✓	✓
EP2308617-010	27-Jun-2023 12:33	0083_OTH104_230627	✓	✓
EP2308617-011	27-Jun-2023 12:56	0083_MW112_4.5-5.0_2...	✓	✓
EP2308617-012	27-Jun-2023 13:18	0083_MW107_3.1-4.1_2...	✓	✓
EP2308617-013	27-Jun-2023 13:57	0083_MW111_8.5-9.0_2...	✓	✓
EP2308617-014	27-Jun-2023 14:27	0083_MW110_9.0-9.5_2...	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]cardno.com.au

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]esdat.com.au
- Chain of Custody (CoC) (COC)	Email	[redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT)	Email	[redacted]esdat.com.au
- EDI Format - XTab (XTAB)	Email	[redacted]esdat.com.au

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]stantec.com
- Chain of Custody (CoC) (COC)	Email	[redacted]stantec.com
- EDI Format - ESDAT (ESDAT)	Email	[redacted]stantec.com
- EDI Format - XTab (XTAB)	Email	[redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308617**	Page	: 1 of 15
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 53948	Issue Date	: 11-Jul-2023 21:31
Sampler	: [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 14		
No. of samples analysed	: 14		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- ED037-P (Alkalinity): Samples EP2308617-3 and 14 were centrifuged before analysis to reduce possible interference from sediment which may consume the alkalinity titrant.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW129_1.5-2.0_230627	0083_OTH113_230627	0083_MW130_3.4-3.9_230627	0083_MW134_230627	0083_MW004_230627
				Sampling date / time	27-Jun-2023 09:25	27-Jun-2023 09:48	27-Jun-2023 10:05	27-Jun-2023 10:25	27-Jun-2023 11:04
					EP2308617-001	EP2308617-002	EP2308617-003	EP2308617-004	EP2308617-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**273**	**118**	**312**	**270**	**253**
Total Alkalinity as CaCO3	----	1	mg/L		**273**	**118**	**312**	**270**	**253**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2380**	**2440**	**2110**	**2040**	**241**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**16800**	**17500**	**14700**	**14100**	**1270**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**499**	**446**	**430**	**447**	**104**
Magnesium	7439-95-4	1	mg/L		**1410**	**1470**	**1260**	**1060**	**114**
Sodium	7440-23-5	1	mg/L		**10700**	**11100**	**9130**	**8670**	**743**
Potassium	7440-09-7	1	mg/L		**532**	**573**	**469**	**445**	**43**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**529**	**547**	**465**	**446**	**45.9**
ø Total Cations	----	0.01	meq/L		**620**	**641**	**534**	**498**	**48.0**
ø Ionic Balance	----	0.01	%		**7.93**	**7.91**	**6.95**	**5.56**	**2.23**
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	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.03**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.06**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW129_1.5-2.0_230627	0083_OTH113_230627	0083_MW130_3.4-3.9_230627	0083_MW134_230627	0083_MW004_230627
				Sampling date / time	27-Jun-2023 09:25	27-Jun-2023 09:48	27-Jun-2023 10:05	27-Jun-2023 10:25	27-Jun-2023 11:04
Compound	CAS Number	LOR	Unit		EP2308617-001	EP2308617-002	EP2308617-003	EP2308617-004	EP2308617-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW129_1.5-2.0_230627	0083_OTH113_230627	0083_MW130_3.4-3.9_230627	0083_MW134_230627	0083_MW004_230627
				Sampling date / time	27-Jun-2023 09:25	27-Jun-2023 09:48	27-Jun-2023 10:05	27-Jun-2023 10:25	27-Jun-2023 11:04
Compound	CAS Number	LOR	Unit		EP2308617-001	EP2308617-002	EP2308617-003	EP2308617-004	EP2308617-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.09**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.09**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.09**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**110**	**106**	**106**	**105**
13C8-PFOA	----	0.02	%		**96.9**	**99.5**	**92.7**	**99.3**	**95.5**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW105_4.0-4.5_230627	0083_MW210_230627	0083_MW212_230627	0083_MW119_230627	0083_MW112_4.5-5.0_230627
				Sampling date / time	27-Jun-2023 11:20	27-Jun-2023 11:31	27-Jun-2023 11:43	27-Jun-2023 12:01	27-Jun-2023 12:56
Compound	CAS Number	LOR	Unit		EP2308617-006	EP2308617-007	EP2308617-008	EP2308617-009	EP2308617-011
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		240	167	220	291	249
Total Alkalinity as CaCO3	----	1	mg/L		240	167	220	291	249
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1490	232	725	959	2400
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		9140	1870	5180	6180	16600
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		280	90	173	193	422
Magnesium	7439-95-4	1	mg/L		822	117	420	478	1390
Sodium	7440-23-5	1	mg/L		5720	1140	3200	3510	10400
Potassium	7440-09-7	1	mg/L		291	46	170	213	539
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		294	60.9	166	200	523
ø Total Cations	----	0.01	meq/L		338	64.9	187	207	602
ø Ionic Balance	----	0.01	%		7.00	3.15	6.00	1.72	6.97
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	0.78	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	1.08	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		0.07	0.09	0.01	9.14	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	0.12	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.06	0.05	<0.01	0.24	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	0.4	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.06	0.12	<0.02	0.97	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		0.06	0.10	<0.02	3.16	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW105_4.0-4.5_230627	0083_MW210_230627	0083_MW212_230627	0083_MW119_230627	0083_MW112_4.5-5.0_230627
				Sampling date / time	27-Jun-2023 11:20	27-Jun-2023 11:31	27-Jun-2023 11:43	27-Jun-2023 12:01	27-Jun-2023 12:56
Compound	CAS Number	LOR	Unit		EP2308617-006	EP2308617-007	EP2308617-008	EP2308617-009	EP2308617-011
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.06**	<0.02	**0.27**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.04**	<0.01	**0.20**	<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)	24448-09-7	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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW105_4.0-4.5_230627	0083_MW210_230627	0083_MW212_230627	0083_MW119_230627	0083_MW112_4.5-5.0_230627
				Sampling date / time	27-Jun-2023 11:20	27-Jun-2023 11:31	27-Jun-2023 11:43	27-Jun-2023 12:01	27-Jun-2023 12:56
Compound	CAS Number	LOR	Unit		EP2308617-006	EP2308617-007	EP2308617-008	EP2308617-009	EP2308617-011
					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		**0.25**	**0.46**	**0.01**	**16.4**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.13**	**0.14**	**0.01**	**9.38**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.25**	**0.46**	**0.01**	**15.2**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.9**	**97.7**	**101**	**106**	**103**
13C8-PFOA	----	0.02	%		**113**	**101**	**105**	**99.6**	**98.3**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW107_3.1-4.1_230627	0083_MW111_8.5-9.0_230627	0083_MW110_9.0-9.5_230627	----	----
				Sampling date / time	27-Jun-2023 13:18	27-Jun-2023 13:57	27-Jun-2023 14:27	----	----
Compound	CAS Number	LOR	Unit		EP2308617-012	EP2308617-013	EP2308617-014	--------	--------
					Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		299	787	262	----	----
Total Alkalinity as CaCO3	----	1	mg/L		299	787	262	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2370	1940	712	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		16200	13900	6080	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		413	367	206	----	----
Magnesium	7439-95-4	1	mg/L		1340	1120	446	----	----
Sodium	7440-23-5	1	mg/L		10100	8360	3550	----	----
Potassium	7440-09-7	1	mg/L		522	426	202	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		512	448	192	----	----
ø Total Cations	----	0.01	meq/L		584	485	206	----	----
ø Ionic Balance	----	0.01	%		6.50	3.94	3.77	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	----	----
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		0.02	0.02	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW107_3.1-4.1_230627	0083_MW111_8.5-9.0_230627	0083_MW110_9.0-9.5_230627	----	----
				Sampling date / time	27-Jun-2023 13:18	27-Jun-2023 13:57	27-Jun-2023 14:27	----	----
Compound	CAS Number	LOR	Unit		EP2308617-012	EP2308617-013	EP2308617-014	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW107_3.1-4.1_230627	0083_MW111_8.5-9.0_230627	0083_MW110_9.0-9.5_230627	----	----
				Sampling date / time	27-Jun-2023 13:18	27-Jun-2023 13:57	27-Jun-2023 14:27	----	----
Compound	CAS Number	LOR	Unit		EP2308617-012	EP2308617-013	EP2308617-014	--------	--------
					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		**0.02**	**0.02**	<0.01	**----**	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.02**	**0.02**	<0.01	**----**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.02**	**0.02**	<0.01	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**96.1**	**100**	**----**	**----**
13C8-PFOA	----	0.02	%		**95.2**	**96.2**	**92.4**	**----**	**----**

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH104_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 12:33	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2308617-010	--------	--------	--------	--------	
				Result	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**122**	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	**122**	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2640**	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	**17400**	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	**451**	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	**1490**	----	----	----	----	
Sodium	7440-23-5	1	mg/L	**11300**	----	----	----	----	
Potassium	7440-09-7	1	mg/L	**585**	----	----	----	----	
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L	**548**	----	----	----	----	
ø **Total Cations**	----	0.01	meq/L	**652**	----	----	----	----	
ø **Ionic Balance**	----	0.01	%	**8.62**	----	----	----	----	
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	0.01	µg/L	<0.01	----	----	----	----	
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	----	----	----	----	

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH104_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 12:33	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308617-010	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH104_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 12:33	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308617-010	--------	--------	--------	--------
					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	----	----	----	----
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	%		**103**	----	----	----	----
13C8-PFOA	----	0.02	%		**97.0**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	**Low**	**High**
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

Sub-Matrix: **MARINE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	**Low**	**High**
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EP2308617**	Page	: 1 of 11
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 53948	Issue Date	: 11-Jul-2023
Sampler	: [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 14		
No. of samples analysed	: 14		

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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 5149912)									
EP2308617-002	0083_OTH113_230627	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	118	120	1.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	118	120	1.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5154289)									
EP2308617-002	0083_OTH113_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2440	2520	2.9	0% - 20%
EP2308617-011	0083_MW112_4.5-5.0_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2400	2360	1.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5154290)									
EP2308617-002	0083_OTH113_230627	ED045G: Chloride	16887-00-6	1	mg/L	17500	16900	3.1	0% - 20%
EP2308617-011	0083_MW112_4.5-5.0_230627	ED045G: Chloride	16887-00-6	1	mg/L	16600	16600	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5151337)									
EP2308617-001	0083_MW129_1.5-2.0_230627	ED093F: Calcium	7440-70-2	1	mg/L	499	494	1.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1410	1410	0.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10700	10600	0.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	532	530	0.4	0% - 20%
EP2308617-011	0083_MW112_4.5-5.0_230627	ED093F: Calcium	7440-70-2	1	mg/L	422	421	0.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1390	1380	0.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10400	10400	0.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	539	541	0.3	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159185)									
EP2308617-007	0083_MW210_230627	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159185)									
EP2308617-007	0083_MW210_230627	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.12	0.12	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159181) - continued									
EP2308611-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159185)									
EP2308617-007	0083_MW210_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159185)									
EP2308617-007	0083_MW210_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159185) - continued									
EP2308617-007	0083_MW210_230627	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159181)									
EP2308611-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159185)									
EP2308617-007	0083_MW210_230627	EP231X: Sum of PFAS	----	0.01	µg/L	0.46	0.45	2.2	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.14	0.13	7.4	0% - 50%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.46	0.45	2.2	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5149912)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	97.5	87.8	118
				<1	200 mg/L	100	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5154289)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	89.9	112
				<1	500 mg/L	99.7	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5154290)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.8	88.6	113
				<1	1000 mg/L	98.9	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5151337)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.1	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.3	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.6	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.8	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159181)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	99.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	98.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	105	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	102	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	96.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	112	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	100	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	101	53.0	142

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159196)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	104	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	92.9	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	99.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	107	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	103	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159181)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	95.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	106	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	104	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159196)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.8	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159196) - continued								
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	96.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	95.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	109	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159181)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	103	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	92.4	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	90.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	111	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	104	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	114	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159196)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.4	60.5	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159196) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	97.9	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	108	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	99.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159181)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	98.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	110	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	110	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159185)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	118	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	105	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159196)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	104	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	107	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	101	64.2	133
EP231P: PFAS Sums (QCLot: 5159181)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159185)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159196)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 5159196) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5154289)							
EP2308617-001	0083_MW129_1.5-2.0_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5154290)							
EP2308617-001	0083_MW129_1.5-2.0_230627	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	90.9	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	109	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	102	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	98.5	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	108	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	110	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	110	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	92.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.5	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	106	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	98.1	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	99.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	104	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	102	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	59.0	135

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185) - continued							
EP2308621-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	117	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	96.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	107	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	109	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159185)							
EP2308621-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	109	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	103	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	106	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308617**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA GW - MB	Issue Date	: 11-Jul-2023
Sampler	: [redacted]	No. of samples received	: 14
Order number	: pfas-omp HEHA	No. of samples analysed	: 14

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308617--001	0083_MW129_1.5-2.0_230627	**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	EP2308617--001	0083_MW129_1.5-2.0_230627	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	----	----	----	06-Jul-2023	04-Jul-2023	**2**
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,						
0083_MW004_230627,	0083_MW105_4.0-4.5_230627,						
0083_MW210_230627,	0083_MW212_230627,						
0083_MW119_230627,	0083_OTH104_230627,						
0083_MW112_4.5-5.0_230627,	0083_MW107_3.1-4.1_230627,						
0083_MW111_8.5-9.0_230627,	0083_MW110_9.0-9.5_230627						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC 1	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Alkalinity by Auto Titrator	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	33	6.06	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	33	3.03	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**----**	----	**----**	**04-Jul-2023**	11-Jul-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW105_4.0-4.5_230627,							
0083_MW210_230627,	0083_MW212_230627,							
0083_MW119_230627,	0083_OTH104_230627,							
0083_MW112_4.5-5.0_230627,	0083_MW107_3.1-4.1_230627,							
0083_MW111_8.5-9.0_230627,	0083_MW110_9.0-9.5_230627							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**----**	----	**----**	**10-Jul-2023**	25-Jul-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW105_4.0-4.5_230627,							
0083_MW210_230627,	0083_MW212_230627,							
0083_MW119_230627,	0083_OTH104_230627,							
0083_MW112_4.5-5.0_230627,	0083_MW107_3.1-4.1_230627,							
0083_MW111_8.5-9.0_230627,	0083_MW110_9.0-9.5_230627							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**----**	----	**----**	**10-Jul-2023**	25-Jul-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW105_4.0-4.5_230627,							
0083_MW210_230627,	0083_MW212_230627,							
0083_MW119_230627,	0083_OTH104_230627,							
0083_MW112_4.5-5.0_230627,	0083_MW107_3.1-4.1_230627,							
0083_MW111_8.5-9.0_230627,	0083_MW110_9.0-9.5_230627							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**----**	----	**----**	**06-Jul-2023**	04-Jul-2023	×
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW105_4.0-4.5_230627,							
0083_MW210_230627,	0083_MW212_230627,							
0083_MW119_230627,	0083_OTH104_230627,							
0083_MW112_4.5-5.0_230627,	0083_MW107_3.1-4.1_230627,							
0083_MW111_8.5-9.0_230627,	0083_MW110_9.0-9.5_230627							

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)								
0083_MW105_4.0-4.5_230627,	0083_MW210_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
0083_MW212_230627								
HDPE (no PTFE) (EP231X)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW119_230627,							
0083_OTH104_230627,	0083_MW112_4.5-5.0_230627,							
0083_MW107_3.1-4.1_230627,	0083_MW111_8.5-9.0_230627,							
0083_MW110_9.0-9.5_230627								
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW105_4.0-4.5_230627,	0083_MW210_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
0083_MW212_230627								
HDPE (no PTFE) (EP231X)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW119_230627,							
0083_OTH104_230627,	0083_MW112_4.5-5.0_230627,							
0083_MW107_3.1-4.1_230627,	0083_MW111_8.5-9.0_230627,							
0083_MW110_9.0-9.5_230627								
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0083_MW105_4.0-4.5_230627,	0083_MW210_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
0083_MW212_230627								
HDPE (no PTFE) (EP231X)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW119_230627,							
0083_OTH104_230627,	0083_MW112_4.5-5.0_230627,							
0083_MW107_3.1-4.1_230627,	0083_MW111_8.5-9.0_230627,							
0083_MW110_9.0-9.5_230627								

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_MW105_4.0-4.5_230627,	0083_MW210_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
0083_MW212_230627								
HDPE (no PTFE) (EP231X)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW119_230627,							
0083_OTH104_230627,	0083_MW112_4.5-5.0_230627,							
0083_MW107_3.1-4.1_230627,	0083_MW111_8.5-9.0_230627,							
0083_MW110_9.0-9.5_230627								
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0083_MW105_4.0-4.5_230627,	0083_MW210_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
0083_MW212_230627								
HDPE (no PTFE) (EP231X)								
0083_MW129_1.5-2.0_230627,	0083_OTH113_230627,	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
0083_MW130_3.4-3.9_230627,	0083_MW134_230627,							
0083_MW004_230627,	0083_MW119_230627,							
0083_OTH104_230627,	0083_MW112_4.5-5.0_230627,							
0083_MW107_3.1-4.1_230627,	0083_MW111_8.5-9.0_230627,							
0083_MW110_9.0-9.5_230627								

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**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	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	33	**6.06**	**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
Laboratory Control Samples (LCS)							
Alkalinity by Auto 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	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	33	**9.09**	**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
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	33	**9.09**	**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
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	1	33	**3.03**	**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
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2308621

Telephone - 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083_PFASOTP_23 **Client:** STANTEC **Project Manager:** [redacted]

54002 54001 54000 53947 53946

ALS Compass COC Reference: 53948 **# Samples:** **Phone:** ( )

54004 54005

Sampler:

Phone: ( )

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 28/06/23	Date / Time: 2/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: 54000 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW218		27/06/2023 09:38 AM	WATER	ALS: 5 Non ALS: 0	No	X		Extra lab QAQC PFAS
002	0083_MW027		27/06/2023 10:25 AM	WATER	ALS: 3 Non ALS: 0	No	X		
003	0083_QC111		27/06/2023 10:28 AM	WATER	ALS: 3 Non ALS: 0	No	X		
004	0083_MW213		27/06/2023 10:50 AM	WATER	ALS: 3 Non ALS: 0	No	X		
005	0083_QC112		27/06/2023 10:51 AM	WATER	ALS: 3 Non ALS: 0	No	X		
006	0083_MW019		27/06/2023 11:13 AM	WATER	ALS: 3 Non ALS: 0	No	X		
007	0083_QC113		27/06/2023 11:14 AM	WATER	ALS: 3 Non ALS: 0	No	X		
008	0083_MW017		27/06/2023 12:00 PM	WATER	ALS: 3 Non ALS: 0	No	X		
009	0083_QC114		27/06/2023 12:01 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 54000 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

[redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_MW103		27/06/2023 12:15 PM	WATER	ALS: 3 Non ALS: 0	No	X		
011	0083_MW102		27/06/2023 12:43 PM	WATER	ALS: 3 Non ALS: 0	No	X		
012	0083_MW101		27/06/2023 12:53 PM	WATER	ALS: 3 Non ALS: 0	No	X		
013	0083_MW214		27/06/2023 01:07 PM	WATER	ALS: 3 Non ALS: 0	No	X		
014	0083_MW104		27/06/2023 01:46 PM	WATER	ALS: 3 Non ALS: 0	No	X		
015	0083_MW109		27/06/2023 02:03 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 54000 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW218	HDPE (no PTFE)	20 mL	00350822000346	Grey	No	
001	0083_MW218	HDPE (no PTFE)	20 mL	00350621066800	Grey	No	
001	0083_MW218	HDPE (no PTFE)	20 mL	00350621067095	Grey	No	
001	0083_MW218	HDPE (no PTFE)	20 mL	00350822000562	Grey	No	
001	0083_MW218	Clear Plastic Bottle - Natural	125 mL	00071121129687	Green	No	
002	0083_MW027	HDPE (no PTFE)	20 mL	00350822082009	Grey	No	
002	0083_MW027	HDPE (no PTFE)	20 mL	00350822082257	Grey	No	
002	0083_MW027	Clear Plastic Bottle - Natural	125 mL	00071121129833	Green	No	
003	0083_QC111	HDPE (no PTFE)	20 mL	00350822000468	Grey	No	
003	0083_QC111	HDPE (no PTFE)	20 mL	00350822000334	Grey	No	
003	0083_QC111	Clear Plastic Bottle - Natural	125 mL	00071121129657	Green	No	
004	0083_MW213	HDPE (no PTFE)	20 mL	00350822082117	Grey	No	
004	0083_MW213	HDPE (no PTFE)	20 mL	00350822082272	Grey	No	
004	0083_MW213	Clear Plastic Bottle - Natural	125 mL	00071121129673	Green	No	
005	0083_QC112	HDPE (no PTFE)	20 mL	00350821001912	Grey	No	
005	0083_QC112	HDPE (no PTFE)	20 mL	00350821001772	Grey	No	
005	0083_QC112	Clear Plastic Bottle - Natural	125 mL	00070522145001	Green	No	
006	0083_MW019	HDPE (no PTFE)	20 mL	00350822000550	Grey	No	
006	0083_MW019	HDPE (no PTFE)	20 mL	00350822000512	Grey	No	
006	0083_MW019	Clear Plastic Bottle - Natural	125 mL	00071121129619	Green	No	
007	0083_QC113	HDPE (no PTFE)	20 mL	00350522043188	Grey	No	
007	0083_QC113	HDPE (no PTFE)	20 mL	00350522043096	Grey	No	
007	0083_QC113	Clear Plastic Bottle - Natural	125 mL	00070522145184	Green	No	
008	0083_MW017	HDPE (no PTFE)	20 mL	00350821001950	Grey	No	
008	0083_MW017	HDPE (no PTFE)	20 mL	00350821001846	Grey	No	
008	0083_MW017	Clear Plastic Bottle - Natural	125 mL	00070522145101	Green	No	

CHAIN OF CUSTODY

ALS COC#: 54000 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA GW - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0083_QC114	HDPE (no PTFE)	20 mL	00350821001867	Grey	No	
009	0083_QC114	HDPE (no PTFE)	20 mL	00350821001949	Grey	No	
009	0083_QC114	Clear Plastic Bottle - Natural	125 mL	00070522145182	Green	No	
010	0083_MW103	HDPE (no PTFE)	20 mL	00350522043132	Grey	No	
010	0083_MW103	HDPE (no PTFE)	20 mL	00350522042867	Grey	No	
010	0083_MW103	Clear Plastic Bottle - Natural	125 mL	00070522144986	Green	No	
011	0083_MW102	HDPE (no PTFE)	20 mL	00350821001942	Grey	No	
011	0083_MW102	HDPE (no PTFE)	20 mL	00350821001732	Grey	No	
011	0083_MW102	Clear Plastic Bottle - Natural	125 mL	00070522145159	Green	No	
012	0083_MW101	HDPE (no PTFE)	20 mL	00350821001686	Grey	No	
012	0083_MW101	HDPE (no PTFE)	20 mL	00350821001787	Grey	No	
012	0083_MW101	Clear Plastic Bottle - Natural	125 mL	00070522162834	Green	No	
013	0083_MW214	HDPE (no PTFE)	20 mL	00350522042999	Grey	No	
013	0083_MW214	HDPE (no PTFE)	20 mL	00350522042750	Grey	No	
013	0083_MW214	Clear Plastic Bottle - Natural	125 mL	00070522145013	Green	No	
014	0083_MW104	HDPE (no PTFE)	20 mL	00350821001969	Grey	No	
014	0083_MW104	HDPE (no PTFE)	20 mL	00350821001948	Grey	No	
014	0083_MW104	Clear Plastic Bottle - Natural	125 mL	00070522145168	Green	No	
015	0083_MW109	HDPE (no PTFE)	20 mL	00350822000480	Grey	No	
015	0083_MW109	HDPE (no PTFE)	20 mL	00350822000484	Grey	No	
015	0083_MW109	Clear Plastic Bottle - Natural	125 mL	00071121129691	Green	No	

Total Bottle Count: ALS: 47, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2308621**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 3
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 54000	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - CG		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 15 / 15

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 see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

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

EP2308621-014 : 27-Jun-2023 13:46 : 0083_MW104_5.5-6.0_230627
EP2308621-015 : 27-Jun-2023 14:03 : 0083_MW109_6.5-7.0_230627

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	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308621-001	27-Jun-2023 09:38	0083_MW218_230627	✓	✓
EP2308621-002	27-Jun-2023 10:25	0083_MW027_230627	✓	✓
EP2308621-003	27-Jun-2023 10:28	0083_QC111_230627	✓	✓
EP2308621-004	27-Jun-2023 10:50	0083_MW213_230627	✓	✓
EP2308621-005	27-Jun-2023 10:51	0083_QC112_230627	✓	✓
EP2308621-006	27-Jun-2023 11:13	0083_MW019_230627	✓	✓
EP2308621-007	27-Jun-2023 11:14	0083_QC113_230627	✓	✓
EP2308621-008	27-Jun-2023 12:00	0083_MW017_230627	✓	✓
EP2308621-009	27-Jun-2023 12:01	0083_QC114_230627	✓	✓
EP2308621-010	27-Jun-2023 12:15	0083_MW103_230627	✓	✓
EP2308621-011	27-Jun-2023 12:43	0083_MW102_230627	✓	✓
EP2308621-012	27-Jun-2023 12:53	0083_MW101_230627	✓	✓
EP2308621-013	27-Jun-2023 13:07	0083_MW214_230627	✓	✓
EP2308621-014	27-Jun-2023 13:46	0083_MW104_5.5-6.0_2...	✓	✓
EP2308621-015	27-Jun-2023 14:03	0083_MW109_6.5-7.0_2...	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]cardno.com.au

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]esdat.com.au
- Chain of Custody (CoC) (COC)	Email	[redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT)	Email	[redacted]esdat.com.au
- EDI Format - XTab (XTAB)	Email	[redacted]esdat.com.au

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]stantec.com
- Chain of Custody (CoC) (COC)	Email	[redacted]stantec.com
- EDI Format - ESDAT (ESDAT)	Email	[redacted]stantec.com
- EDI Format - XTab (XTAB)	Email	[redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308621**	Page	: 1 of 12
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54000	Issue Date	: 12-Jul-2023 18:25
Sampler	: [redacted]		
Site	: HEHA GW - CG		
Quote number	: SY/139/19 B		
No. of samples received	: 15		
No. of samples analysed	: 15		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EP231X: The LOR of particular analytes has been raised due to sample matrix interference.
- ED093F, ED041G and ED045G: Results for sample #6, 7, 8 and 9 have been confirmed by re-preparation and re-analysis.
- Ionic Balance out of acceptable limits for sample #13 due to analytes not quantified in this report. Major cations (ED093F) and major anions (ED041G/ED045G) have been confirmed by re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW218_230627	0083_MW027_230627	0083_QC111_230627	0083_MW213_230627	0083_QC112_230627
				Sampling date / time	27-Jun-2023 09:38	27-Jun-2023 10:25	27-Jun-2023 10:28	27-Jun-2023 10:50	27-Jun-2023 10:51
Compound	CAS Number	LOR	Unit		EP2308621-001	EP2308621-002	EP2308621-003	EP2308621-004	EP2308621-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		204	319	317	219	242
Total Alkalinity as CaCO3	----	1	mg/L		204	319	317	219	242
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		288	1210	1330	149	153
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1290	7010	7640	155	181
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		59	292	303	86	86
Magnesium	7439-95-4	1	mg/L		103	605	665	38	40
Sodium	7440-23-5	1	mg/L		903	4550	5020	105	118
Potassium	7440-09-7	1	mg/L		67	245	268	12	12
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		46.5	229	250	11.8	13.1
ø Total Cations	----	0.01	meq/L		52.4	268	295	12.3	13.0
ø Ionic Balance	----	0.01	%		6.02	7.88	8.36	1.83	0.39
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.08	0.03	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.08	0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	1.62	0.63	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	0.03	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.41	0.21	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	0.2	<0.2	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	0.64	0.20	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	0.61	0.21	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW218_230627	0083_MW027_230627	0083_QC111_230627	0083_MW213_230627	0083_QC112_230627
				Sampling date / time	27-Jun-2023 09:38	27-Jun-2023 10:25	27-Jun-2023 10:28	27-Jun-2023 10:50	27-Jun-2023 10:51
Compound	CAS Number	LOR	Unit		EP2308621-001	EP2308621-002	EP2308621-003	EP2308621-004	EP2308621-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.27**	**0.11**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.10**	**0.05**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	**0.02**	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW218_230627	0083_MW027_230627	0083_QC111_230627	0083_MW213_230627	0083_QC112_230627
				Sampling date / time	27-Jun-2023 09:38	27-Jun-2023 10:25	27-Jun-2023 10:28	27-Jun-2023 10:50	27-Jun-2023 10:51
Compound	CAS Number	LOR	Unit		EP2308621-001	EP2308621-002	EP2308621-003	EP2308621-004	EP2308621-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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	**4.06**	**1.46**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**2.03**	**0.84**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**3.93**	**1.44**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**107**	**103**	**101**	**102**	**98.0**
13C8-PFOA	----	0.02	%		**105**	**98.0**	**96.3**	**97.9**	**98.6**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW019_230627	0083_QC113_230627	0083_MW017_230627	0083_QC114_230627	0083_MW103_230627
				Sampling date / time	27-Jun-2023 11:13	27-Jun-2023 11:14	27-Jun-2023 12:00	27-Jun-2023 12:01	27-Jun-2023 12:15
Compound	CAS Number	LOR	Unit		EP2308621-006	EP2308621-007	EP2308621-008	EP2308621-009	EP2308621-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		295	325	367	364	317
Total Alkalinity as CaCO3	----	1	mg/L		295	325	367	364	317
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		856	1150	1150	925	1170
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		6810	8520	6840	5010	5930
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		256	313	277	217	275
Magnesium	7439-95-4	1	mg/L		517	696	568	410	511
Sodium	7440-23-5	1	mg/L		3950	5360	4230	2940	3770
Potassium	7440-09-7	1	mg/L		185	251	218	154	213
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		216	271	224	168	198
ø Total Cations	----	0.01	meq/L		232	312	250	176	225
ø Ionic Balance	----	0.01	%		3.58	7.15	5.46	2.48	6.44
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	0.05	0.08	0.10
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	0.05	0.11	0.10
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		0.05	0.05	1.20	4.46	0.71
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.11	0.06	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.01	0.01	13.9	5.05	0.07
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		<0.3	<0.2	1.1	4.6	0.4
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.06	0.04	3.24	9.92	1.10
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		0.04	0.04	3.34	11.5	1.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW019_230627	0083_QC113_230627	0083_MW017_230627	0083_QC114_230627	0083_MW103_230627
				Sampling date / time	27-Jun-2023 11:13	27-Jun-2023 11:14	27-Jun-2023 12:00	27-Jun-2023 12:01	27-Jun-2023 12:15
Compound	CAS Number	LOR	Unit		EP2308621-006	EP2308621-007	EP2308621-008	EP2308621-009	EP2308621-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.05**	**0.04**	**2.10**	**8.23**	**0.33**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.68**	**2.35**	**0.05**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**0.05**	**0.06**	<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)	24448-09-7	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	**2.36**	**4.63**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	**0.28**	**0.49**	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW019_230627	0083_QC113_230627	0083_MW017_230627	0083_QC114_230627	0083_MW103_230627
				Sampling date / time	27-Jun-2023 11:13	27-Jun-2023 11:14	27-Jun-2023 12:00	27-Jun-2023 12:01	27-Jun-2023 12:15
Compound	CAS Number	LOR	Unit		EP2308621-006	EP2308621-007	EP2308621-008	EP2308621-009	EP2308621-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**0.21**	**0.18**	**28.5**	**51.5**	**3.88**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.06**	**0.06**	**15.1**	**9.51**	**0.78**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.21**	**0.18**	**28.2**	**51.3**	**3.78**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.8**	**99.4**	**101**	**97.9**	**103**
13C8-PFOA	----	0.02	%		**95.4**	**99.0**	**100**	**103**	**97.2**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW102_230627	0083_MW101_230627	0083_MW214_230627	0083_MW104_5.5-6.0_230627	0083_MW109_6.5-7.0_230627
				Sampling date / time	27-Jun-2023 12:43	27-Jun-2023 12:53	27-Jun-2023 13:07	27-Jun-2023 13:46	27-Jun-2023 14:03
					EP2308621-011	EP2308621-012	EP2308621-013	EP2308621-014	EP2308621-015
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**332**	**791**	**296**	**376**	**631**
Total Alkalinity as CaCO3	----	1	mg/L		**332**	**791**	**296**	**376**	**631**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1090**	**734**	**60**	**857**	**2300**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**7630**	**7620**	**100**	**5000**	**14600**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**258**	**227**	**23**	**250**	**404**
Magnesium	7439-95-4	1	mg/L		**584**	**696**	**19**	**431**	**1280**
Sodium	7440-23-5	1	mg/L		**4340**	**5080**	**76**	**3020**	**9920**
Potassium	7440-09-7	1	mg/L		**245**	**271**	**7**	**171**	**526**
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**244**	**246**	**9.98**	**166**	**472**
ø **Total Cations**	----	0.01	meq/L		**256**	**296**	**6.20**	**184**	**570**
ø **Ionic Balance**	----	0.01	%		**2.28**	**9.30**	**23.4**	**4.94**	**9.41**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.03	<0.03	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.03**	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		**0.24**	**0.17**	<0.01	<0.01	<0.01
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		**0.07**	<0.01	**0.08**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.2	<0.2	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.21**	**0.08**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.19**	**0.10**	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW102_230627	0083_MW101_230627	0083_MW214_230627	0083_MW104_5.5-6.0_230627	0083_MW109_6.5-7.0_230627
				Sampling date / time	27-Jun-2023 12:43	27-Jun-2023 12:53	27-Jun-2023 13:07	27-Jun-2023 13:46	27-Jun-2023 14:03
Compound	CAS Number	LOR	Unit		EP2308621-011	EP2308621-012	EP2308621-013	EP2308621-014	EP2308621-015
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.15**	**0.07**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.05**	**0.02**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW102_230627	0083_MW101_230627	0083_MW214_230627	0083_MW104_5.5-6.0_230627	0083_MW109_6.5-7.0_230627
				Sampling date / time	27-Jun-2023 12:43	27-Jun-2023 12:53	27-Jun-2023 13:07	27-Jun-2023 13:46	27-Jun-2023 14:03
Compound	CAS Number	LOR	Unit		EP2308621-011	EP2308621-012	EP2308621-013	EP2308621-014	EP2308621-015
					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		**0.94**	**0.44**	**0.08**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.31**	**0.17**	**0.08**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.91**	**0.44**	**0.08**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.0**	**105**	**106**	**97.7**	**109**
13C8-PFOA	----	0.02	%		**102**	**91.1**	**93.8**	**97.3**	**98.0**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EP2308621**	Page	: 1 of 10
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54000	Issue Date	: 12-Jul-2023
Sampler	: [redacted]		
Site	: HEHA GW - CG		
Quote number	: SY/139/19 B		
No. of samples received	: 15		
No. of samples analysed	: 15		

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, unless the sampling was conducted by ALS. 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5147604)									
EP2308611-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	144	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	144	0.9	0% - 20%
EP2308612-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	134	1.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	131	134	1.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 5149912)									
EP2308617-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	118	120	1.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	118	120	1.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 5149913)									
EP2308621-010	0083_MW103_230627	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	317	318	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	317	318	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148893)									
EP2308616-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14200	14300	0.9	0% - 20%
EP2308621-009	0083_QC114_230627	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	925	933	0.9	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148894)									
EP2308616-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	129000	127000	1.7	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 5148894) - continued									
EP2308621-009	0083_QC114_230627	ED045G: Chloride	16887-00-6	1	mg/L	5010	5030	0.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5145416)									
EP2308611-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	414	414	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1320	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9980	10200	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	548	554	1.1	0% - 20%
EP2308612-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	459	467	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1450	1460	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11200	11400	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	589	596	1.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5145417)									
EP2308621-004	0083_MW213_230627	ED093F: Calcium	7440-70-2	1	mg/L	86	89	2.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	38	39	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	105	106	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.0	0% - 50%
EP2308621-014	0083_MW104_5.5-6.0_230627	ED093F: Calcium	7440-70-2	1	mg/L	250	272	8.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	431	472	9.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3020	3300	9.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	171	187	8.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.12	0.12	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159185)									
EP2308617-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.46	0.45	2.2	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.14	0.13	7.4	0% - 50%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.46	0.45	2.2	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5147604)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	96.0	87.8	118
				<1	200 mg/L	99.8	87.8	118
ED037P: Alkalinity by PC Titrator (QCLot: 5149912)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	97.5	87.8	118
				<1	200 mg/L	100	87.8	118
ED037P: Alkalinity by PC Titrator (QCLot: 5149913)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	98.0	87.8	118
				<1	200 mg/L	101	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148893)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	89.9	112
				<1	500 mg/L	92.0	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148894)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	88.6	113
				<1	1000 mg/L	95.3	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5145416)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	84.6	108

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 5145417)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.5	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.6	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.0	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.6	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	96.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	112	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	100	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	101	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159196)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	104	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	92.9	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	99.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	107	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	103	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159197)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	104	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	101	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	111	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	105	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	109	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	106	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	104	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159196)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	94.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	96.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	95.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	109	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159197)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	106	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	105	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	113	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	111	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	96.7	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	104	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.2	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	114	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159196)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.4	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	97.9	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	108	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	99.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159197)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	119	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	103	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	109	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	116	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	112	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	108	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159185)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	118	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	105	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159196)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	104	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	107	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159196) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	101	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159197)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	110	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	114	64.2	133
EP231P: PFAS Sums (QCLot: 5159185)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159196)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5159197)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148893)							
EP2308616-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148894)							
EP2308616-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159185) - continued							
EP2308621-001	0083_MW218_230627	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	90.9	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	109	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	102	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	98.5	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	108	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159185)							
EP2308621-001	0083_MW218_230627	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	110	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	110	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	92.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.5	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	106	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	98.1	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	99.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	104	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	102	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159185)							
EP2308621-001	0083_MW218_230627	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	117	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	96.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	107	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	109	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159185)							
EP2308621-001	0083_MW218_230627	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	109	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	103	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	106	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308621**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA GW - CG	Issue Date	: 12-Jul-2023
Sampler	: [redacted]	No. of samples received	: 15
Order number	: pfas-omp HEHA	No. of samples analysed	: 15

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308616--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	EP2308616--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations						
Clear Plastic Bottle - Natural						
0083_MW218_230627, 0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_QC114_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	----	----	----	05-Jul-2023	04-Jul-2023	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
	4				
Laboratory Duplicates (DUP)					
Alkalinity by Auto Titrator	4	50	8.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	32	3.13	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	32	3.13	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW218_230627, 0083_MW027_230627, 0083_QC111_230627	**27-Jun-2023**	**----**	----	**----**	**03-Jul-2023**	11-Jul-2023	✓
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_QC114_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**----**	----	**----**	**04-Jul-2023**	11-Jul-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW218_230627, 0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_QC114_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**----**	----	**----**	**08-Jul-2023**	25-Jul-2023	✓
Clear Plastic Bottle - Natural (ED041G)							
0083_MW101_230627	**27-Jun-2023**	**----**	----	**----**	**10-Jul-2023**	25-Jul-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW218_230627, 0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_QC114_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**----**	----	**----**	**10-Jul-2023**	25-Jul-2023	✓

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)							
0083_MW218_230627, 0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_QC114_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**----**	----	**----**	**05-Jul-2023**	04-Jul-2023	✗
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW218_230627, 0083_QC114_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW218_230627, 0083_QC114_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW218_230627, 0083_QC114_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW218_230627, 0083_QC114_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW218_230627, 0083_QC114_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	24-Dec-2023	✓
HDPE (no PTFE) (EP231X)							
0083_MW027_230627, 0083_QC111_230627, 0083_MW213_230627, 0083_QC112_230627, 0083_MW019_230627, 0083_QC113_230627, 0083_MW017_230627, 0083_MW103_230627, 0083_MW102_230627, 0083_MW101_230627, 0083_MW214_230627, 0083_MW104_5.5-6.0_230627, 0083_MW109_6.5-7.0_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	4	50	**8.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	32	**3.13**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	6	50	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	32	**9.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	3	50	**6.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	32	**9.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	32	**3.13**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2308622
Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083_PFASOTP_23 **Client:** STANTEC **Project Manager** [redacted]

54002 54001 54000 53947 53946 ~~53949~~ ~~53950~~ **Phone:** ( )

ALS Compass COC Reference: 53948 **# Samples:** ~~53951~~ ~~53952~~ **Sampler:**

54004 54005 **Phone:** ( )

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 28/06/23	Date / Time: 2/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **54001** *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SD - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD113		27/06/2023 11:30 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

'OC#: **54001** *ALS Laboratory:* EP Perth

MWHAUS - STANTEC AUSTRALIA PTY LTD

: WA_0083_PFASOMP_23

HEHA SD - CG

D: pfas-omp HEHA

MANAGER [redacted]

SAMPLER: [redacted]

'ORTS TO: [redacted]

DICES TO: [redacted]

QUOTE NO: SY/139/19 B

[redacted] / ES2022MWHAUS0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 'C

Other comments:

SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
0083_SD113	HDPE Soil Jar	200 mL	00621222066981	Grey	No	

Total Bottle Count: ALS: 1, Non ALS: 0

2023 8:45:06 AM

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308622**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 54001	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - CG		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
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 see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2308622-001	27-Jun-2023 11:30	0083_SD113_230627	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308622**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 06-Jul-2023
C-O-C number	: 54001	Issue Date	: 10-Jul-2023 15:33
Sampler	: [redacted]		
Site	: HEHA SD - CG		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

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

- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD113_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 11:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308622-001	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**13.8**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0003**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0038**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0007**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0005**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0002**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0002**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD113_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 11:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308622-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		**0.0064**	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0116**	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0237**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0041**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0237**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**122**	----	----	----	----
13C8-PFOA	----	0.0002	%		**101**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131

QUALITY CONTROL REPORT

Work Order	: **EP2308622**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 06-Jul-2023
C-O-C number	: 54001	Issue Date	: 10-Jul-2023
Sampler	: [redacted]		
Site	: HEHA SD - CG		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5156795)									
EP2308615-001	Anonymous	EA055: Moisture Content	----	0.1	%	20.6	22.2	7.6	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5152739)									
EP2308615-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	47.6	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308752-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0014	0.0015	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0200	0.0191	4.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5152739)									
EP2308615-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5152739) - continued									
EP2308615-001	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2308752-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0007	0.0006	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0008	0.0008	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5152739)									
EP2308615-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308752-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5152739)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5152739) - continued									
EP2308615-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308752-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5152739)									
EP2308615-001	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
EP2308752-002	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0237	0.0228	3.9	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0214	0.0206	3.8	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0237	0.0228	3.9	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5152739)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	104	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	102	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	110	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	102	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5152739)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	105	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5152739)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	104	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.7	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5152739)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5152739) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	114	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	104	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	108	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	90.4	54.8	124
EP231P: PFAS Sums (QCLot: 5152739)								
EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5152739)							
EP2308615-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	110	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	117	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	104	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	115	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	120	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	125	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5152739)							
EP2308615-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	116	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	111	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	93.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	95.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	103	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	118	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.0	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	102	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	85.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	79.3	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	114	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5152739)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5152739) - continued							
EP2308615-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	73.6	48.0	128
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	114	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	94.0	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	112	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	103	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	90.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5152739)							
EP2308615-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	126	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	109	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	117	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	114	60.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308622**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA SD - CG	Issue Date	: 10-Jul-2023
Sampler	: [redacted]	No. of samples received	: 1
Order number	: pfas-omp HEHA	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / 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)							
0083_SD113_230627	**27-Jun-2023**	**----**	----	----	**06-Jul-2023**	11-Jul-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD113_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD113_230627	**27-Jun-2023**	**06-Jul-2023**	24-Dec-2023	✓	**10-Jul-2023**	15-Aug-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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 Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	* ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALSCompass SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2308623

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0083 - PFASOTIP_23 Client: STANTEC

54002 54001 54000 53947 53946 ~~53945~~

ALS Compass COC Reference: 53948 # Samples: ~~5~~ ~~5~~

54004 54005

Project Manager [redacted]
Phone: ( )

Sampler:
Phone: ( )

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 28/06/23	Date / Time: 2/6 1130	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 54002 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SW113		27/06/2023 11:31 AM	WATER	ALS: 3 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 54002 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0083_PFASOMP_23

SITE: HEHA SW/OTH - CG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B [redacted] / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SW113	HDPE (no PTFE)	20 mL	00350822082189	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00350822082015	Grey	No	
001	0083_SW113	Clear Plastic Bottle - Natural	125 mL	00071121129633	Green	No	

Total Bottle Count: ALS: 3, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2308623**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0083_PFASOMP_23	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 54002	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - CG		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 29-Jun-2023 11:30	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 11-Jul-2023	Scheduled Reporting Date	: **11-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 11.5 - Ice present
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 see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **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 laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308623-001	27-Jun-2023 11:31	0083_SW113_230627	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **EP2308623**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54002	Issue Date	: 11-Jul-2023 15:20
Sampler	: [redacted]		
Site	: HEHA SW/OTH - CG		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract 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 - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 11:31	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308623-001	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**97**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**97**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**190**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**142**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**115**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**10**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**97**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**7**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**9.90**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**11.0**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**5.08**	----	----	----	----
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	0.01	µg/L		**0.49**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.68**	----	----	----	----
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		**0.5**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**4.84**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.77**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 11:31	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308623-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.90**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.26**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.10**	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
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		**0.77**	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.42**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_230627	----	----	----	----
				Sampling date / time	27-Jun-2023 11:31	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2308623-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**10.7**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**1.17**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**10.6**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	----	----	----	----
13C8-PFOA	----	0.02	%		**91.6**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EP2308623**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 30-Jun-2023
C-O-C number	: 54002	Issue Date	: 11-Jul-2023
Sampler	: [redacted] [redacted]		
Site	: HEHA SW/OTH - CG		
Quote number	: SY/139/19 B		
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, unless the sampling was conducted by ALS. 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Thomas Donovan	Senior Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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.

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	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 5149913)									
EP2308621-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	317	318	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	317	318	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148879)									
EP2308620-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2440	2470	1.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148880)									
EP2308840-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1460	1460	0.2	0% - 20%
EP2308620-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17800	17800	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5145417)									
EP2308621-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	86	89	2.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	38	39	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	105	106	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.0	0% - 50%
EP2308621-014	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	250	272	8.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	431	472	9.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3020	3300	9.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	171	187	8.9	0% - 20%

Method Blank (MB) and Laboratory Control Sample (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 Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5149913)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	98.0	87.8	118
				<1	200 mg/L	101	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148879)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	89.9	112
				<1	500 mg/L	93.9	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148880)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.6	88.6	113
				<1	1000 mg/L	97.4	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5145417)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.5	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.6	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.0	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.6	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159197)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	104	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	101	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	111	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	105	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	109	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159197)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	106	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159197) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	105	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	113	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159197)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	119	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	103	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	109	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	116	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	112	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	108	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159197)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	110	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	114	64.2	133
EP231P: PFAS Sums (QCLot: 5159197)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148879)							
EP2308620-001	Anonymous						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148879) - continued							
EP2308620-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148880)							
EP2308620-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2308623**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0083_PFASOMP_23	Date Samples Received	: 29-Jun-2023
Site	: HEHA SW/OTH - CG	Issue Date	: 11-Jul-2023
Sampler	: [redacted]	No. of samples received	: 1
Order number	: pfas-omp HEHA	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

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308620--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	EP2308620--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations						
Clear Plastic Bottle - Natural 0083_SW113_230627	----	----	----	05-Jul-2023	04-Jul-2023	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Regular	Rate (%): Actual	Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) 0083_SW113_230627	**27-Jun-2023**	**----**	----	**----**	**04-Jul-2023**	11-Jul-2023	✓

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)							
0083_SW113_230627	**27-Jun-2023**	**----**	----	**----**	**06-Jul-2023**	25-Jul-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_SW113_230627	**27-Jun-2023**	**----**	----	**----**	**06-Jul-2023**	25-Jul-2023	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_SW113_230627	**27-Jun-2023**	**----**	----	**----**	**05-Jul-2023**	04-Jul-2023	×
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW113_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW113_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_SW113_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW113_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_SW113_230627	**27-Jun-2023**	**07-Jul-2023**	24-Dec-2023	✓	**11-Jul-2023**	24-Dec-2023	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	1	10	**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	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	10	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	10	**20.00**	**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	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**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	0	10	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM 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 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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

00903KBJ54

eurofins | mgt

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CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Stantec Australia

Office Address : 226 Adelaide Tce, Perth, WA, 6000

[redacted]

Purchase Order : PFAS-OMP 304700525

PROJECT Number : WA_0083_PFASOMP_23

PROJECT Name : WA_0083_PFASOMP_23

COC Number : AS-OMP 304700525 -01

Eurofins | mgt quote ID : NA

Data output format: PDF; ESDAT

[redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0083_QC208_230627	27/06/2023	Water	X
2	0083_QC209_230627	27/06/2023	Soil	X
3	0083_QC210_230627	27/06/2023	Water	X
4	0083_QC211_230627	27/06/2023	Water	X
5	0083_QC212_230627	27/06/2023	Water	X
6	0083_QC213_230627	27/06/2023	Water	X
7	0083_QC214_230627	27/06/2023	Water	X
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

Analytes

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

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

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

Sample comments:

Relinquished By: Stantec

Date & Time : 29/06/2023

Signature:

Laboratory Staff

Received By: [illegible]

Date & Time : 30/6/23 09:15 5.5C

Signature:

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐

STANDARD ☑ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal

Courier Consignment # : 00903KBJ54

Temperature on arrival:

Report number: 1004390

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NATA# 2377 Site# 2370

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Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (WA)
Contact name:	[redacted]
Project name:	WA_0083_PFASOMP_23
Project ID:	WA_0083_PFASOMP_23
Turnaround time:	5 Day
Date/Time received	Jun 30, 2023 9:15 AM
Eurofins reference	1004390

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.
N/A	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Harvey on phone : or by email: AndrewHarvey@eurofins.com

Results will be delivered electronically via email to [redacted] - [redacted]stantec.com.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (WA) email address.

Global Leader - Results you can trust

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0083_PFASOMP_23
Project ID: WA_0083_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004390
Phone: 0458 839 200
Fax:

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X		X
Melbourne Laboratory - NATA # 1261 Site # 1254							X	
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC208_230627	Jun 27, 2023		Water	L23-JI0002319		X	
2	0083_QC09_230627	Jun 27, 2023		Soil	L23-JI0002320	X		X
3	0083_QC210_230627	Jun 27, 2023		Water	L23-JI0002321		X	
4	0083_QC211_230627	Jun 27, 2023		Water	L23-JI0002322		X	
5	0083_QC212_230627	Jun 27, 2023		Water	L23-JI0002323		X	
6	0083_QC213_230627	Jun 27, 2023		Water	L23-JI0002324		X	
7	0083_QC214_230627	Jun 27, 2023		Water	L23-JI0002325		X	

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0083_PFASOMP_23
Project ID: WA_0083_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004390
Phone: 0458 839 200
Fax:

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370	X		X
Melbourne Laboratory - NATA # 1261 Site # 1254		X	
External Laboratory			
Test Counts	1	6	1

Stantec Australia Pty Limited
6F 226,Adelaide Terrace
Perth
WA 6000

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: [redacted]

Report **1004390-S**
Project name WA_0083_PFASOMP_23
Project ID WA_0083_PFASOMP_23
Received Date Jun 30, 2023

Client Sample ID			**0083_QC209_230627**
Sample Matrix			**Soil**
Eurofins Sample No.			**L23-JI0002320**
Date Sampled			**Jun 27, 2023**
Test/Reference	LOR	Unit	
Sample Properties			
% Moisture	1	%	27
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)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	60
13C5-PFPeA (surr.)	1	%	76
13C5-PFHxA (surr.)	1	%	90
13C4-PFHpA (surr.)	1	%	96
13C8-PFOA (surr.)	1	%	97
13C5-PFNA (surr.)	1	%	102
13C6-PFDA (surr.)	1	%	113
13C2-PFUnDA (surr.)	1	%	117
13C2-PFDoDA (surr.)	1	%	111
13C2-PFTeDA (surr.)	1	%	85
Perfluoroalkyl sulfonamido substances			
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

Client Sample ID			0083_QC209_230627
Sample Matrix			**Soil**
Eurofins Sample No.			**L23-JI0002320**
Date Sampled			**Jun 27, 2023**
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
13C8-FOSA (surr.)	1	%	101
D3-N-MeFOSA (surr.)	1	%	100
D5-N-EtFOSA (surr.)	1	%	109
D7-N-MeFOSE (surr.)	1	%	87
D9-N-EtFOSE (surr.)	1	%	78
D5-N-EtFOSAA (surr.)	1	%	69
D3-N-MeFOSAA (surr.)	1	%	68
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	116
18O2-PFHxS (surr.)	1	%	122
13C8-PFOS (surr.)	1	%	107
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	66
13C2-6:2 FTSA (surr.)	1	%	83
13C2-8:2 FTSA (surr.)	1	%	87
13C2-10:2 FTSA (surr.)	1	%	105
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 DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

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

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
% Moisture	Melbourne	Jul 03, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jul 04, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Received: Jun 30, 2023 9:15 AM
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Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0083_QC208_230627	Jun 27, 2023		Water	L23-JI0002319		X
2	0083_QC209_230627	Jun 27, 2023		Soil	L23-JI0002320	X	X
3	0083_QC210_230627	Jun 27, 2023		Water	L23-JI0002321		X
4	0083_QC211_230627	Jun 27, 2023		Water	L23-JI0002322		X
5	0083_QC212_230627	Jun 27, 2023		Water	L23-JI0002323		X
6	0083_QC213_230627	Jun 27, 2023		Water	L23-JI0002324		X
7	0083_QC214_230627	Jun 27, 2023		Water	L23-JI0002325		X
Test Counts						1	7

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
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.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. 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	
Perfluorooctanoic 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 (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane 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-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	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	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	85			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	73			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	86			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	85			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	88			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	102			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	92			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	102			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	81			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	85			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	94			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	83			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	83			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	82			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	83			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	83			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	71			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	92			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	66			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	70			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	75			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	85			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	82			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	96			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	78			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	83			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	80			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	82			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	L23-JI0002362	NCP	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L23-JI0002362	NCP	%	82			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L23-JI0002362	NCP	%	96			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	L23-JI0002362	NCP	%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)	L23-JI0002362	NCP	%	96			50-150	Pass	
Perfluorononanoic acid (PFNA)	L23-JI0002362	NCP	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	L23-JI0002362	NCP	%	98			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	L23-JI0002362	NCP	%	106			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	L23-JI0002362	NCP	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	L23-JI0002362	NCP	%	108			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L23-JI0002362	NCP	%	93			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	L23-JI0002362	NCP	%	91			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L23-JI0002362	NCP	%	95			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L23-JI0002362	NCP	%	86			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L23-JI0002362	NCP	%	91			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L23-JI0002362	NCP	%	89			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L23-JI0002362	NCP	%	88			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L23-JI0002362	NCP	%	93			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L23-JI0002362	NCP	%	77			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	L23-JI0002362	NCP	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L23-JI0002362	NCP	%	70			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L23-JI0002362	NCP	%	74			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L23-JI0002362	NCP	%	80			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L23-JI0002362	NCP	%	89			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	L23-JI0002362	NCP	%	85			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L23-JI0002362	NCP	%	96			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L23-JI0002362	NCP	%	83			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L23-JI0002362	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L23-JI0002362	NCP	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L23-JI0002362	NCP	%	91			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L23-JI0002354	NCP	%	3.9	3.7	5.2	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L23-JI0002360	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L23-JI0002360	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L23-JI0002360	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L23-JI0002360	NCP	ug/kg	< 5	< 5	<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	N/A
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.
N15	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:

Andrew Harvey	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS
Mary Makarios	Senior Analyst-Sample Properties

Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request

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Stantec Australia Pty Limited
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NATA Accredited
Accreditation Number 2377
Site Number 2370

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Attention: [redacted]

Report **1004390-W**
Project name WA_0083_PFASOMP_23
Project ID WA_0083_PFASOMP_23
Received Date Jun 30, 2023

Client Sample ID			**0083_QC208_230627**	**0083_QC210_230627**	**0083_QC211_230627**	**0083_QC212_230627**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**L23-JI0002319**	**L23-JI0002321**	**L23-JI0002322**	**L23-JI0002323**
Date Sampled			**Jun 27, 2023**	**Jun 27, 2023**	**Jun 27, 2023**	**Jun 27, 2023**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.06	< 0.05	0.10	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.21	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.22	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.10	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.05	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	78	62	70	79
13C5-PFPeA (surr.)	1	%	86	127	68	119
13C5-PFHxA (surr.)	1	%	96	129	79	130
13C4-PFHpA (surr.)	1	%	79	115	78	113
13C8-PFOA (surr.)	1	%	85	132	122	143
13C5-PFNA (surr.)	1	%	50	127	95	121
13C6-PFDA (surr.)	1	%	64	88	120	106
13C2-PFUnDA (surr.)	1	%	60	73	124	68
13C2-PFDoDA (surr.)	1	%	54	69	126	48
13C2-PFTeDA (surr.)	1	%	62	72	158	46
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	25	105	92	98
D3-N-MeFOSA (surr.)	1	%	36	87	52	49

Client Sample ID			0083_QC208_230627	0083_QC210_230627	0083_QC211_230627	0083_QC212_230627
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**L23-JI0002319**	**L23-JI0002321**	**L23-JI0002322**	**L23-JI0002323**
Date Sampled			**Jun 27, 2023**	**Jun 27, 2023**	**Jun 27, 2023**	**Jun 27, 2023**
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	39	73	52	37
D7-N-MeFOSE (surr.)	1	%	55	101	138	43
D9-N-EtFOSE (surr.)	1	%	63	94	134	37
D5-N-EtFOSAA (surr.)	1	%	46	49	179	59
D3-N-MeFOSAA (surr.)	1	%	71	74	193	87
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	0.05	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	0.02	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	[N09]0.02	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.55	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.18	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	111	134	115	134
18O2-PFHxS (surr.)	1	%	90	128	96	128
13C8-PFOS (surr.)	1	%	58	107	116	112
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	147	91	138	91
13C2-6:2 FTSA (surr.)	1	%	147	107	189	129
13C2-8:2 FTSA (surr.)	1	%	76	58	172	97
13C2-10:2 FTSA (surr.)	1	%	56	57	188	50
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	0.73	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	0.23	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	0.78	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.06	< 0.05	1.46	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	1.51	< 0.1

Client Sample ID			0083_QC213_230627	0083_QC214_230627
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**L23-JI0002324**	**L23-JI0002325**
Date Sampled			**Jun 27, 2023**	**Jun 27, 2023**
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	3.9
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	0.04	12
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	0.02	[N09]14
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	0.01	[N09]8.6
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	[N09]2.2

Client Sample ID			0083_QC213_230627	0083_QC214_230627
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**L23-JI0002324**	**L23-JI0002325**
Date Sampled			**Jun 27, 2023**	**Jun 27, 2023**
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	0.05
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	72	62
13C5-PFPeA (surr.)	1	%	57	74
13C5-PFHxA (surr.)	1	%	65	82
13C4-PFHpA (surr.)	1	%	59	84
13C8-PFOA (surr.)	1	%	94	82
13C5-PFNA (surr.)	1	%	75	116
13C6-PFDA (surr.)	1	%	83	127
13C2-PFUnDA (surr.)	1	%	53	110
13C2-PFDoDA (surr.)	1	%	33	111
13C2-PFTeDA (surr.)	1	%	30	119
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	61	122
D3-N-MeFOSA (surr.)	1	%	69	107
D5-N-EtFOSA (surr.)	1	%	53	92
D7-N-MeFOSE (surr.)	1	%	50	151
D9-N-EtFOSE (surr.)	1	%	43	142
D5-N-EtFOSAA (surr.)	1	%	92	90
D3-N-MeFOSAA (surr.)	1	%	113	126
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.06
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	[N09]0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.02
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.16
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]0.04	[N09]4.1
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	[N09]0.08
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.01	[N09]4.9
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	109	83
18O2-PFHxS (surr.)	1	%	91	79
13C8-PFOS (surr.)	1	%	96	76

Client Sample ID			0083_QC213_230627	0083_QC214_230627
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**L23-JI0002324**	**L23-JI0002325**
Date Sampled			**Jun 27, 2023**	**Jun 27, 2023**
Test/Reference	LOR	Unit		
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.05	ug/L	< 0.05	6.4
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	0.32
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	107	111
13C2-6:2 FTSA (surr.)	1	%	165	77
13C2-8:2 FTSA (surr.)	1	%	139	92
13C2-10:2 FTSA (surr.)	1	%	61	117
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	0.05	9
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.01	7.1
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.05	11.2
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.12	56.48
Sum of PFASs (n=30)*	0.1	ug/L	0.12	56.8

Sample History

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

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 Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jul 03, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Project Name: WA_0083_PFASOMP_23
Project ID: WA_0083_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004390
Phone: 0458 839 200
Fax:

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0083_QC208_230627	Jun 27, 2023		Water	L23-JI0002319		X
2	0083_QC209_230627	Jun 27, 2023		Soil	L23-JI0002320	X	X
3	0083_QC210_230627	Jun 27, 2023		Water	L23-JI0002321		X
4	0083_QC211_230627	Jun 27, 2023		Water	L23-JI0002322		X
5	0083_QC212_230627	Jun 27, 2023		Water	L23-JI0002323		X
6	0083_QC213_230627	Jun 27, 2023		Water	L23-JI0002324		X
7	0083_QC214_230627	Jun 27, 2023		Water	L23-JI0002325		X
Test Counts						1	7

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
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.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	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							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	84			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	80			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	87			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	86			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	86			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	76			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	87			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	90			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	138			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	90			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	73			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	81			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	72			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	81			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	83			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	83			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	94			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	71			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	75			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	68			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	77			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	78			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	90			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	82			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	59			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	94			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	L23-JI0002187	NCP	%	88			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L23-JI0002187	NCP	%	135			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L23-JI0002187	NCP	%	147			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	L23-JI0002187	NCP	%	107			50-150	Pass	
Perfluorooctanoic acid (PFOA)	L23-JI0002187	NCP	%	100			50-150	Pass	
Perfluorononanoic acid (PFNA)	L23-JI0002187	NCP	%	85			50-150	Pass	
Perfluorodecanoic acid (PFDA)	L23-JI0002187	NCP	%	65			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	L23-JI0002187	NCP	%	78			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	L23-JI0002187	NCP	%	78			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	L23-JI0002187	NCP	%	120			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L23-JI0002187	NCP	%	76			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	L23-JI0002187	NCP	%	67			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L23-JI0002187	NCP	%	64			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L23-JI0002187	NCP	%	56			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L23-JI0002187	NCP	%	72			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L23-JI0002187	NCP	%	71			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L23-JI0002187	NCP	%	75			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L23-JI0002187	NCP	%	81			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L23-JI0002187	NCP	%	71			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	L23-JI0002187	NCP	%	123			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L23-JI0002187	NCP	%	71			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L23-JI0002187	NCP	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L23-JI0002187	NCP	%	136			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0003901	NCP	%	96			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0003901	NCP	%	88			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L23-JI0002187	NCP	%	98			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L23-JI0002187	NCP	%	71			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0016574	NCP	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L23-JI0002187	NCP	%	72			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L23-JI0002187	NCP	%	78			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)	M23-JI0012311	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0011013	NCP	ug/L	0.02	0.02	7.5	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0011013	NCP	ug/L	0.19	0.23	21	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0011013	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	N/A
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.
N15	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:

Andrew Harvey	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS

Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request

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APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

Cardno

now

Stantec

Monitoring Date	Monitoring Location	Sample_ID	Screen Interval (m)	Screen Level	TOC (mAHD)	Well Depth (m)	SWL (mbTOC)	RWL (mAHD)	Other Observations	Sampling Method	R1 - Temp (°C)	R1 - DO (mg/L)	R1 - EC (us/Cm)	R1 - TDS (mg/L)
27/06/2023	MW004	0083_MW004_230627	1.5-4.5_	Single_Level	2.989	4.5	2.1	0.889	PVC casing bent	HydraSleeve	24.6	2.07	5227	3393
27/06/2023	MW008		2.5-5.5_	Single_Level	2.846	5.5			PVC casing damaged bgl, sleeve stuck not sampled	HydraSleeve				
27/06/2023	MW017	0083_MW017_230627	3-6_	Single_Level	3.421	6.0	3.378	0.043		HydraSleeve	26.9	2.93	17546	11404
27/06/2023	MW019	0083_MW019_230627	1.5-4.5_	Single_Level	2.955	4.5	2.995	-0.04	HC Sheen. odour	HydraSleeve	23	3.98	28060	18238
27/06/2023	MW027	0083_MW027_230627	3-6_	Single_Level	4.499	6.0	4.469	0.03		HydraSleeve	26.1	1.7	27534	17902
27/06/2023	MW101	0083_MW101_230627	2-4.5_	Single_Level	2.4356	4.5	2.434	0.002		HydraSleeve	25.9	1.7	28450	18502
27/06/2023	MW102	0083_MW102_230627	1-6_	Single_Level	2.6924	6.0	2.639	0.053		HydraSleeve	27.4	1.52	25671	16683
27/06/2023	MW103	0083_MW103_230627	1-6_	Single_Level	2.7898	6.0	2.727	0.063		HydraSleeve	27.3	1.04	22112	14377
27/06/2023	MW104	0083_MW104_5.5-6_230627	5.5-6_	Multi_level	3.9903	6.0	3.939	0.051		Peristaltic Pump	26.2	0.87	18725	12175
27/06/2023	MW105	0083_MW105_4-4.5_230627	4-4.5_	Multi_level	3.1082	4.5	2.81	0.298		Peristaltic Pump	27	1.9	30377	19851
27/06/2023	MW107	0083_MW107_3.1-4.1_230627	3.1-4.1_	Multi_level	4.7144	4.1	2.56	2.154		Peristaltic Pump	24.4	2.32	49078	31928
27/06/2023	MW109	0083_MW109_6.5-7_230627	6.5-7_	Multi_level	7.0426	7.0	4.659	2.384		Peristaltic Pump	24.9	4.98	53883	35002
27/06/2023	MW110	0083_MW110_9-9.5_230627	9-9.5_	Multi_level	8.2807	9.5	7.915	0.366		Peristaltic Pump	23.5	4.64	20396	13253
27/06/2023	MW111	0083_MW111_8.5-9_230627	8.5-9_	Multi_level	8.8159	9.0	8.3	0.516		Peristaltic Pump	25.3	2.48	40694	26435
27/06/2023	MW112	0083_MW112_4.5-5.0_230627	4.5-5_	Multi_level	3.0636	5.0	2.54	0.524		Peristaltic Pump	23.5	3.9	49805	32350
27/06/2023	MW113	0083_MW113_2.5-3.5_230627	2.5-3.5_	Multi_level	2.97	3.5	2.56	0.41		Peristaltic Pump	23.3	2.74	36984	24043
27/06/2023	MW114	0083_MW114_4.5-5_230627	4.5-5_	Multi_level	2.9516	5.0	2.61	0.342		Peristaltic Pump	23.7	1.53	54209	35232
27/06/2023	MW115	0083_MW115_2-3_230627	2-3_	Multi_level	2.6281	3.0	2.41	0.218		Peristaltic Pump	20.7	4.38	28539	18555
27/06/2023	MW116	0083_MW116_4.5-5_230627	4.5-5_	Multi_level	2.3885	5.0	2.06	0.329		Peristaltic Pump	19.1	4.91	52069	33842
27/06/2023	MW117	0083_MW117_4-4.5_230627	4-4.5_	Multi_level	2.6554	4.5	2.4	0.255		Peristaltic Pump	21.4	5.54	6790	4413
27/06/2023	MW119	0083_MW119_230627	2.1-5.1_	Single_Level	3.5069	5.1	3.29	0.217		HydraSleeve	27.3	0.77	18825	12278.5
27/06/2023	MW129	0083_MW129_1.5-2_230627	1.5-2_	Multi_level	2.0256	2.0	1.66	0.366		Peristaltic Pump	21.1	3.61	44033	28613.5
27/06/2023	MW130	0083_MW130_3.4-3.9_230627	3.4-3.9_	Multi_level	2.0555	3.9	1.925	0.13		Peristaltic Pump	22.2	2.97	45672	29698
27/06/2023	MW134	0083_MW134_230627	6.5-12.5_	Single_Level	10.0786	12.5	9.68	0.399		HydraSleeve	23.3	1.82	41866	27215.5
27/06/2023	MW202	0083_MW202_230627	6.9-9.9_	Single_Level	8.069	NA	7.5	0.569		HydraSleeve	25.5	2.35	30585	19874
27/06/2023	MW210	0083_MW210_230627	1.5-4_	Single_Level	2.863	4.0	2.48	0.383		HydraSleeve	25.6	0.69	3134	2028
27/06/2023	MW212	0083_MW212_230627	1-4_	Single_Level	3.513	4.0	3.12	0.393		HydraSleeve	25.2	1	11458	7449
27/06/2023	MW213	0083_MW213_230627	2.5-5.5_	Single_Level	4.49	5.5	4.37	0.12		HydraSleeve	24.3	3.57	1305	848
27/06/2023	MW214	0083_MW214_230627	2.5-5.5_	Single_Level	4.29	5.5	3.315	0.975		HydraSleeve	25.7	2.5	1690	1098
27/06/2023	MW217		1.2-4.5_	Single_Level	3.658	4.5			Bore blocked with roots at 3.28 mbtoc	HydraSleeve				
27/06/2023	MW218	0083_MW218_230627	2.8-5.8_	Single_Level	5.137	5.8	4.959	0.178		HydraSleeve	24.6	4.63	6832	4443
27/06/2023	OTH002								No visible pipe overflowing not sampled					
27/06/2023	OTH101	0083_OTH101_230627								Direct into bottle	19.5	5.75	55067	35792
27/06/2023	OTH102	0083_OTH102_230627								Direct into bottle	19.4	6.02	55193	35880
27/06/2023	OTH103	0083_OTH103_230627								Direct into bottle	19.1	5.4	53889	35035
27/06/2023	OTH104	0083_OTH104_230627								Direct into bottle	18.9	4.93	53722	34924.5
27/06/2023	OTH105	0083_OTH105_230627								Direct into bottle	17.4	6.73	28264	18371
27/06/2023	OTH106	0083_OTH106_230627								Direct into bottle	15.9	6.36	53292	34640
27/06/2023	OTH107	0083_OTH107_230627								Direct into bottle	14.9	6.85	55496	36072
27/06/2023	OTH108	0083_OTH108_230627								Direct into bottle	15.7	6.47	54917	35695
27/06/2023	OTH109	0083_OTH109_230627								Direct into bottle	18.1	5.16	54748	35590
27/06/2023	OTH110	0083_OTH110_230627								Direct into bottle	19.4	6.75	31582	20552
27/06/2023	OTH113	0083_OTH113_230627								Direct into bottle	18.7	4.5	53149	34554

Monitoring Location	R1 - pH	R1 - Eh (mV)	R2 - Temp (°C)	R2 - DO (mg/L)	R2 - EC (us/Cm)	R2 - TDS (mg/L)	R2 - pH	R2 - Eh (mV)	R3 - Temp (°C)	R3 - DO (mg/L)	R3 - EC (us/Cm)	R3 - TDS (mg/L)	R3 - pH	R3 - Eh (mV)	QC Dup Sample #	Odour	Colour
MW004	7.63	-174.6															Clear
MW008																	
MW017	7.3	-6.9													QC114/214		Clear
MW019	7.45	-46.1													QC113/213	Hydrocarbons	Clear
MW027	-6.3														QC111/211		Clear
MW101	7.12	-184.5															Clear
MW102	7.22	-20.1															Clear
MW103	7.29	-26.1															Clear
MW104	7.39	-16.5															Clear
MW105	7.63	0.7	26.3	1.77	30684	19942	7.63	-0.5	25.9	1.74	30705	19961	7.63	-1.1			Clear
MW107	7.6	19.7	24.2	2.34	49296	32051	7.6	19.2	24	2.36	49300	32038	7.59	18.8			Cloudy
MW109	7.7	-0.1															Clear
MW110	7.75	17.3	23.5	4.55	20384	13247	7.75	18	23.4	4.56	20373	13240	7.75	18.7			Cloudy
MW111	7.59	22.2	25.2	2.48	40600	26383	7.58	22	25.2	2.48	40580	26377	7.59	21.9			Cloudy
MW112	7.91	24.2	23.4	3.95	49757	32344	7.9	23.8	23.4	3.97	49736	32324.5	7.9	23.5			Cloudy
MW113	7.74	-90.6	23.3	2.57	36984	24037	7.74	-91.1	23.2	2.6	36966	24025	7.74	-91.8			Brown
MW114	7.59	-101.5	23.7	1.5	54206	35237	7.59	-102.2	23.6	1.5	54201	35230	7.59	-101.9	QC110/210		Brown
MW115	7.97	-72.1	20.6	4.29	28574	18583	7.98	-71.7	20.5	4.25	28816	18607	7.98	-70.8			Cloudy
MW116	7.84	-56.9	19.1	4.89	52022	33825	7.79	-55.2	19	4.88	52011	33812	7.78	-54.1			Clear
MW117	8.05	-67.9	21.3	5.57	6782	4407	8.05	-67.5	21.2	5.59	6774	4402	8.04	-67.5			Clear
MW119	7.43	-40.4															Cloudy
MW129	7.66	12	21	3.62	43956	28561	7.66	13.2	21	3.63	43907	28535	7.66	14			Cloudy
MW130	7.27	29.2															Brown,Cloudy
MW134	7.42	21.7															Brown
MW202	7.56	-184.2															Clear
MW210	8.17	-26.6															Clear
MW212	7.75	8.1															Clear
MW213	8.08	8													QC112/212		Clear
MW214	8.2	-41.1															Clear
MW217																	
MW218	7.85	2.9															Clear
OTH002																	
OTH101	8.19	-75.6															Clear
OTH102	8.15	-74.4															Clear
OTH103	8.15	24.1															Cloudy
OTH104	8.16	23.3															Clear
OTH105	8.09	-69.1															Clear
OTH106	8.36	-70.3															Cloudy
OTH107	8.08	-60.3															Clear
OTH108	8.08	-71.7															Cloudy
OTH109	8.15	-72.6															Clear
OTH110	8.17	-71.3															Clear
OTH113	8.28	25.5															Clear

Monitoring Location	Date	Sample ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Comments	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
SW113	27/06/2023	0083_SW113_230627	Direct into Bottle	0.1	0.3		18.1	7.86	975	634	7.94	3.6	brown	Medium
SW121	27/06/2023					Dry								
SW126	27/06/2023					Dry								
SW127	27/06/2023					Dry								
SW128	27/06/2023	0083_SW128_230627	Direct into Bottle	0	0.05	QC108/208	13.5	1.38	212783	38319.98	7.85	35.1	Clear	Low
SW131	27/06/2023					Dry								

Monitoring Location	Date	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Comments
SD113	27/06/2023	0083_SD113_230627	0.2	Shovel, Trowel	Dry	brown black	
SD121	27/06/2023	0083_SD121_230627	0.1	Shovel, Trowel	Dry	Beige fine sand	
SD126	27/06/2023	0083_SD126_230627	0.1	Shovel, Trowel	Dry	Light brown clay, stiff	
SD127	27/06/2023	0083_SD127_230627	0.1	Shovel, Trowel	Dry	Grey sand trace fines	
SD128	27/06/2023	0083_SD128_230627	0.1	Shovel, Trowel	Wet	Black sandy clay	QC109/209
SD131	27/06/2023	0083_SD131_230627		Shovel, Trowel	Dry	Brown sand	

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20K104050
Cable length: 1m 20K100096

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.30 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.42
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 2 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature (17F100079)	Check Temp NATA	Room Temp	19.4	-0.1	°C	NA	19.3	°C
pH (22F)	pH 7.00	392512	7.01	-9.50	mV	7.06	7.01	pH
pH (22F)	pH 4.00	394799	4.00	163.80	mV	4.03	4.00	pH
Conductivity (17F100079)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.08	2784	2764	µs/cm
ORP (201005SIA605102)	Zobell A & B	23/2504	242	242	mV	209.7	239.4	mV
Zero DO (20H100139)	NaSO3 in distilled water	10175	0.0	NA	NA	0.4	0.0	%
100% DO (20H100139)	100% Air Saturation	Air	100.0	5.93	uA	108.4	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 16-Jun-23
Next Due: 13-Dec-23

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 22B104437
Cable length: 1m (22B100428)

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	171.90 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.25
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 12 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	polarographic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature (22B100315)	Check Temp NATA	Room Temp	17.1	0	°C	NA	17.1	°C
pH (22B)	pH 7.00	392512	7.01	-24.20	mV	7.05	7.01	pH
pH (22B)	pH 4.00	394799	4.00	147.70	mV	3.94	4.00	pH
Conductivity (22B100315)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.09	2791	2764	µs/cm
ORP (22A)	Zobell A & B	23/2404	246	246	mV	236.5	234.6	mV
Zero DO (22B100173)	NaSO3 in distilled water	10175	0.0	NA	NA	0.6	0.0	%
100% DO (22B100173)	100% Air Saturation	Air	100.0	4.8	uA	103.7	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 21-Jun-23
Next Due: 18-Dec-23

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 22C103026
Cable length: 1m (22B100428)

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor **housing**	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	174.10 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.87
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 11 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	polarographic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature (22B100315)	Check Temp NATA	Room Temp	17.6	0	°C	NA	17.6	°C
pH (22D)	pH 7.00	392512	7.01	-15.00	mV	7.06	7.01	pH
pH (22D)	pH 4.00	394799	4.00	159.10	mV	3.98	4.00	pH
Conductivity (22B100315)	2764 µs/cm at 25°C	21/1012	2764	GLP	4.99	2773	2764	µs/cm
ORP (22B)	Zobell A & B	23/2504	245	245	mV	200.9	233.9	mV
Zero DO (22E100254)	NaSO3 in distilled water	10175	0.0	NA	NA	-0.3	0.0	%
100% DO (22E100254)	100% Air Saturation	Air	100.0	4.1	uA	87.3	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 15-Jun-23
Next Due: 12-Dec-23

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 22F101914
Cable length: 1m (22B100428)

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.20 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.61
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 11 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	polarographic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature (22B100314)	Check Temp NATA	Room Temp	17.2	0	°C	NA	17.2	°C
pH (22D)	pH 7.00	392512	7.01	-10.30	mV	7	7.01	pH
pH (22D)	pH 4.00	394799	4.00	162.90	mV	3.95	4.00	pH
Conductivity (22B100314)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.28	2880	2764	µs/cm
ORP (22B)	Zobell A & B	23/2504	246	246	mV	237.1	234.7	mV
Zero DO (22A100300)	NaSO3 in distilled water	10175	0.0	NA	NA	-0.9	0.0	%
100% DO (22A100300)	100% Air Saturation	Air	100.0	4.3	uA	96	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 21-Jun-23
Next Due: 18-Dec-23

Date of Bump Test	Site ID	Unit Brand/ Model	Ambient Air Oxygen Calibration	Zero % Oxygen Solution Calibration	Standard Concentrations	Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?	Comment	Test by (Name)	(Signature)
27/6/23	0083	YSI #22C103026	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N	20.1	pH 4.00: 4.13 pH 7.00: 7.10 EC: 2,828	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) / N	N.I	[redacted]	
27/6/23	0083	YSI #22B104437	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N	19.2	pH 4.00: 4.16 pH 7.00: 7.01 EC: 2,765	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) / N	N.I	[redacted]	
27/6/23	0083	YSI #20K104050	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N	19.5	pH 4.00: 4.17. pH 7.00: 7.04. EC: 2797	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) / N	N.I.	[redacted]	
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			

APPENDIX

E

DATA QUALITY REVIEW

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Data Quality Review
PFAS Ongoing Monitoring Plan
June 2023 Monitoring Event

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
	QA Documentation
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out on the 27th June 2023 and is generally in accordance with the proposed scope of work, as documented in the SAQP (PFAS OMP SAQP HEHA, Rev.7, Cardno, June 2023) issued to the client and in general compliance with Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling,* NEPM *National Environment Protection (Assessment of Site Contamination) Measure* and PFAS NEMP 2.0. A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (PFAS OMP June 2023 Factual Report). In addition, a safety, health and environment work method statement (SHEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
	Data Representativeness
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. Holding times were generally in in compliance with required timeframes, with the following exception: ▪ Dissolved Major Cations (EP2308611, EP2308612, EP2308616, EP2308617, EP2308621, EP2308623) – 1 to 2 days overdue. The holding time exceedance for a minority of results are likely due to the remoteness of the site or laboratory workload. They are not considered to have adversely impacted the reliability of the results obtained, or the conclusions drawn from this assessment. The samples were chilled in eskies with ice and placed into fridges upon receipt by the laboratory.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report and was in general conformance with the SAQP. Experienced field scientists familiar with the sampling procedures were involved in the field works. Non-disposable equipment was decontaminated between sample locations.
Laboratory Reports	The following laboratory reports were considered for this data quality review: ▪ ALS reports: EP2308611, EP2308612, EP2308615, EP2308616, EP2308617, EP2308621, EP2308622, EP2308623. ▪ Eurofins ARL report: 1004390

QA/QC Aspects	Evidence & Evaluation

Data Precision & Accuracy

QC sample Frequency

QC sample type	SAQP required frequency	Sample Collected
Blind duplicate	1 in 10 primary samples (10%)	5 for 29 groundwater samples (17.2%) 1 in 2 surface water samples (50%) 1 in 6 sediment samples (16.7%)
Interlab duplicate	1 in 10 primary samples (10%)	5 for 29 groundwater samples (17.2%) 1 in 2 surface water samples (50%) 1 in 6 sediment samples (16.7%)
Rinsate	1 per field personnel per day	3 for 1 day (3 field personnel) (100%)
Field Blank	1 per field personnel per day	3 for 1 day (3 field personnel) (100%)

The required QC frequency was achieved for all sample types.

RPD Acceptance criteria

Magnitude of Results	Acceptable RPD range
< 10 x LOR	No limits
10 – 20 LOR	0% - 50%
> 20 x LOR	0% - 20%

QC Testing – Blind Duplicates (Primary Lab)

Groundwater

- Primary Groundwater Samples Analysed: 29
- Blind Duplicate Samples Analysed: 5

All RPDs were within acceptance criteria with the following exceptions:

- QC111 (PFHxS – 88%, PFOS – 65%, PFPeA – 105%, PFHxA – 98%, PFHpA – 84%).

A re-run was requested to the laboratory for these samples and the laboratory response was that the results were reliable and the differences in concentrations were due to sample heterogeneity.

- QC114 (PFHxS – 115%, PFOS – 93%, PFBA – 123%, PFPeA – 102%, PFHxA – 110%, PFHpA – 119%, PFOA – 110)

These RPD differences are likely due to the low concentrations of the analytes under review or a water column heterogeneity. The highest result will be used for reporting and interpretation as conservative measure.

Surface water

- Primary surface water Samples Analysed: 2
- Blind Duplicate Samples Analysed: 1

All RPDs were within acceptance criteria.

Sediment

- Primary Sediment Samples Analysed: 6
- Blind Duplicate Samples Analysed: 1

All RPDs were within acceptance criteria.

QA/QC Aspects	Evidence & Evaluation
QC Testing – Interlab Duplicates (Secondary Lab)	***Groundwater*** ▪ Primary Groundwater Samples Analysed: 29 ▪ Interlab Duplicate Samples Analysed: 5 All RPDs were within acceptance criteria with the following exceptions: ▪ QC211 (PFHxS – 99%, PFOS – 78%, PFPeA – 101%, PFHxA – 94%, PFHpA – 92%). ▪ QC214 (PFPeS – 105%, PFHxS – 109%, PFOS 96%, PFBA – 112%, PFPeA – 115%, PFHxA – 123%, PFHpA – 121%, PFOA – 106%, 6:2 FTS – 92%) These exceedances are likely due the difference of methodologies and detection levels between the primary and secondary laboratories, the low concentrations of analytes under review or water column heterogeneity. This is not considered to have impacted the validity of the interpretation drawn upon this dataset. ***Surface water*** ▪ Primary surface water Samples Analysed: 2 ▪ Interlab Duplicate Samples Analysed: 1 All RPDs were within acceptance criteria. ***Sediment*** ▪ Primary sediment Samples Analysed: 6 ▪ Interlab Duplicate Samples Analysed: 1 All RPDs were within acceptance criteria.
Field Blanks	Field Blanks were collected at a rate of one per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, matrix spikes, laboratory control samples and laboratory duplicates. All Method Blank results were within acceptable range. All Matrix Spikes generally reported recoveries within the acceptance range with the exception of the following: ▪ EP2308611, EP2308612, EP2308616, EP2308617, EP2308621, EP2308623: - Samples ID: MW116, OTH107, SW128, MW129, Anonymous: Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. The following quality control frequency outlier was reported: ▪ EP2308611: - Laboratory Duplicates and Matrix Spikes: PFAS by LCMSMS, expected frequency 10% and 5% respectively, not achieved. ▪ EP2308612: - Matrix Spikes: PFAS by LCMSMS, expected frequency 5% not achieved. ▪ EP2308617, EP2308621, EP2308623: - Laboratory Duplicates, PFAS and Alkalinity, expected frequency 10% not achieved. - Matrix Spikes: PFAS by LCMSMS, expected frequency 5% not achieved. The above outliers/exceptions are not considered to affect the reliability of the dataset.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins ARL Accreditation No. 1261

QA/QC Aspects	Evidence & Evaluation
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use and daily readings of reference solutions (bump tests) were completed. The equipment calibration certificates, and daily field bump test records are provided in Appendix D.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day per sampler when reusable equipment was used. All rinsate samples tested reported analytes concentrations below the laboratory LORs.
	Data Comparability
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
	Data Completeness
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process and therefore, the data set used as the basis for groundwater, surface water, porewater and sediment investigation is considered valid and complete.

APPENDIX

D

DATA ASSESSMENT

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Table 1 - HEH-A Groundwater Gauging data

Location ID	Screen Interval Multilevel Well	Date Time	Water Depth (mbTOC)	Elevation (mAHD)	Comments
MW003	-	11/23/2021			Bore damaged at 1mbTOC. unable to sample
MW004	-	11/26/2005	2.71	0.279	
MW004	-	11/23/2021	2.62	0.369	Sampled instead of MW003
MW004	-	1/18/2022	2.62	0.369	Sampled instead of MW003
MW004	-	6/21/2022	2.03	0.959	
MW004	-	11/25/2022	2.6	0.389	
MW004	-	3/27/2023	2.62	0.369	Sampled instead of MW003
MW004		27/06/2023	2.1	0.889	PVC casing bent
MW008	-	11/29/2005	2.71	0.136	
MW008	-	2/28/2018	2.559	0.287	
MW008	-	6/15/2018	2.37	0.476	
MW008	-	10/9/2018	2.667	0.179	
MW008	-	8/23/2019	2.629	0.217	
MW008	-	11/30/2019	2.67	0.176	
MW008	-	3/18/2020	2.62	0.23	
MW008	-	6/26/2020	2.5	0.346	
MW008	-	11/17/2020	2.61	0.236	
MW008	-	6/22/2021	2.305	0.541	
MW008	-	11/23/2021	2.51	0.336	Gatic lid destroyed
MW008	-	1/18/2022	2.51	0.336	Gatic lid destroyed
MW008	-	6/21/2022	1.94	0.906	
MW008	-	11/25/2022	2.5	0.346	
MW008	-	3/27/2023	2.51	0.336	Gatic lid destroyed
MW008		27/06/2023			PVC casing damaged bgl, sleeve stuck not sampled
MW017	-	11/27/2005	3.525	-0.104	
MW017	-	3/3/2016	3.53	-0.109	
MW017	-	2/28/2018	3.41	0.011	
MW017	-	6/16/2018	3.205	0.216	
MW017	-	10/5/2018	3.544	-0.123	
MW017	-	11/28/2019	3.51	-0.089	
MW017	-	6/25/2020	3.31	0.111	
MW017	-	11/18/2020	3.232	0.189	
MW017	-	6/22/2021	3.12	0.301	
MW017	-	11/23/2021	3.428	-0.007	
MW017	-	1/18/2022	3.428	-0.007	
MW017	-	6/21/2022	2.85	0.571	
MW017	-	11/24/2022	3.39	0.031	
MW017	-	3/27/2023	3.428	-0.007	
MW017		27/06/2023	3.378	0.043	
MW019	-	11/28/2005	3.03	-0.075	
MW019	-	9/15/2010	2.276	0.679	
MW019	-	3/14/2011	5.4	-2.445	
MW019	-	3/3/2016	2.97	-0.015	
MW019	-	2/23/2018	2.91	0.045	
MW019	-	6/16/2018	2.707	0.248	
MW019	-	10/11/2018	3.047	-0.092	
MW019	-	8/27/2019	2.99	-0.035	
MW019	-	11/30/2019			Not found
MW019	-	3/18/2020	2.96	-0.01	
MW019	-	6/25/2020	2.865	0.09	
MW019	-	11/18/2020	2.98	-0.025	
MW019	-	6/23/2021	2.61	0.345	
MW019	-	11/23/2021	2.91	0.045	
MW019	-	1/18/2022	2.91	0.045	
MW019	-	6/21/2022	2.26	0.695	
MW019	-	11/23/2022	2.87	0.085	
MW019	-	3/27/2023	2.91	0.045	
MW019		27/06/2023	2.995	-0.04	
MW027	-	11/28/2005	4.62	-0.121	
MW027	-	9/15/2010	3.85	0.649	
MW027	-	3/14/2011	6.96	-2.461	
MW027	-	3/3/2016	4.56	-0.061	
MW027	-	2/23/2018	4.45	0.049	
MW027	-	6/16/2018	4.294	0.205	
MW027	-	10/11/2018	4.626	-0.128	
MW027	-	8/27/2019	4.531	-0.032	
MW027	-	11/28/2019	4.6	-0.101	
MW027	-	6/25/2020	4.44	0.059	
MW027	-	11/18/2020	4.551	-0.052	
MW027	-	6/23/2021	4.18	0.319	
MW027	-	11/23/2021	4.47	0.029	Ant nest in well
MW027	-	1/18/2022	4.47	0.029	Ant nest
MW027	-	6/21/2022	3.87	0.629	
MW027	-	11/23/2022	4.39	0.109	
MW027	-	3/27/2023	4.47	0.029	Ant nest
MW027		27/06/2023	4.469	0.03	
MW101	-	2/28/2018	2.4	0.036	
MW101	-	6/16/2018	2.174	0.262	
MW101	-	10/16/2018	2.571	-0.135	
MW101	-	8/27/2019	2.522	-0.086	
MW101	-	11/30/2019			Not found
MW101	-	3/18/2020	2.45	-0.01	
MW101	-	6/25/2020	2.3	0.136	
MW101	-	11/18/2020	2.473	-0.037	
MW101	-	6/23/2021	2.1	0.336	
MW101	-	11/23/2021	2.364	0.0716	
MW101	-	1/18/2022	2.364	0.072	
MW101	-	6/21/2022	1.795	0.641	
MW101	-	11/24/2022	2.39	0.046	
MW101	-	3/27/2023	2.364	0.072	
MW101		27/06/2023	2.434	0.002	
MW102	-	2/28/2018	2.65	0.042	
MW102	-	6/16/2018	2.438	0.254	
MW102	-	8/27/2019	2.742	-0.05	
MW102	-	11/30/2019			Not found
MW102	-	6/25/2020	2.59	0.102	
MW102	-	11/18/2020	2.49	0.202	
MW102	-	6/22/2021	2.4	0.292	
MW102	-	11/23/2021	2.628	0.0644	
MW102	-	1/18/2022	2.628	0.064	
MW102	-	6/21/2022	2.05	0.642	
MW102	-	11/24/2022	2.605	0.087	
MW102	-	3/27/2023	2.628	0.064	

Location ID	Screen Interval Multilevel Well	Date Time	Water Depth (mbTOC)	Elevation (mAHD)	Comments
MW102		27/06/2023	2.639	0.053	
MW103	-	2/28/2018	2.77	0.02	
MW103	-	6/16/2018	2.544	0.246	
MW103	-	8/25/2019	2.872	-0.082	
MW103	-	11/28/2019	2.88	-0.09	
MW103	-	6/25/2020	2.735	0.055	
MW103	-	11/18/2020	2.857	-0.067	
MW103	-	6/22/2021	2.55	0.24	
MW103	-	11/23/2021	2.742	0.0478	
MW103	-	1/18/2022	2.742	0.048	
MW103	-	6/21/2022	2.2	0.59	
MW103	-	11/24/2022	2.655	0.135	
MW103	-	3/27/2023	2.742	0.048	
MW103		27/06/2023	2.727	0.063	
MW104	3.5-4.0	2/28/2018			
MW104	5.5-6.0	2/28/2018	4.05	-0.06	
MW104	7.5-8.0	2/28/2018	4.03	-0.045	
MW104	9.5-10.0	2/28/2018	4.06	-0.096	
MW104	3.5-4.0	6/18/2018	3.93	0.074	
MW104	5.5-6.0	6/18/2018	3.91	0.08	
MW104	7.5-8.0	6/18/2018	3.886	0.099	
MW104	9.5-10.0	6/18/2018	3.872	0.091	
MW104	5.5-6.0	11/28/2019	4.05	-0.06	
MW104	3.5-4.0	6/25/2020	3.9	0.104	
MW104	5.5-6.0	11/18/2020	4.04	-0.05	
MW104	5.5-6.0	6/22/2021	3.65	0.34	
MW104	5.5-6_	11/23/2021	4.011	-0.0207	QC114 lost in transit to lab
MW104	5.5-6.0	1/18/2022	4.011	-0.021	
MW104	3.5-4.0	6/21/2022	3.6	0.404	
MW104	5.5-6.0	11/24/2022	3.94	0.05	
MW104	5.5-6.0	3/27/2023	4.011	-0.021	
MW104	5.5-6_	27/06/2023	3.939	0.051	
MW105	2.0-2.5	3/3/2018	2.83	0.292	
MW105	4.0-4.5	3/3/2018	2.832	0.276	
MW105	6.0-6.5	3/3/2018	2.85	0.248	
MW105	8.0-8.5	3/3/2018	2.781	0.332	
MW105	2.0-2.5	6/2/2018	2.757	0.365	
MW105	4.0-4.5	6/2/2018	2.7	0.408	
MW105	6.0-6.5	6/2/2018	2.76	0.338	
MW105	8.0-8.5	6/2/2018	2.67	0.443	
MW105	4.0-4.5	10/13/2018	2.984	0.124	
MW105	4.0-4.5	8/29/2019	2.945	0.163	
MW105	4.0-4.5	11/28/2019	3.1	0.008	
MW105	4.0-4.5	6/26/2020	2.8	0.308	
MW105	4.0-4.5	11/17/2020	2.98	0.128	
MW105	4.0-4.5	6/22/2021	2.62	0.488	
MW105	6-6.5_	11/23/2021	2.82	0.2779	
MW105	6.0-6.5	1/18/2022	2.82	0.278	
MW105	4.0-4.5	6/21/2022	2.24	0.868	
MW105	4.0-4.5	11/25/2022	2.8	0.308	
MW105	6.0-6.5	3/27/2023	2.82	0.278	
MW105	4-4.5_	27/06/2023	2.81	0.298	
MW107	3.1-4.1	3/3/2018	4.281	0.433	
MW107	5.5-6.0	3/3/2018	4.322	0.379	
MW107	7.5-8.0	3/3/2018	4.434	0.311	
MW107	3.1-4.1	6/17/2018	4.25	0.464	
MW107	5.5-6.0	6/17/2018	4.29	0.411	
MW107	7.5-8.0	6/17/2018	4.31	0.435	
MW107	5.5-6.0	10/8/2018	4.332	0.382	
MW107	5.5-6.0	8/22/2019	4.471	0.23	
MW107	5.5-6.0	11/30/2019	5.44	-0.739	
MW107	7.5-8.0	6/26/2020	4.254	0.491	
MW107	5.5-6.0	11/17/2020	4.36	0.341	
MW107	3.1-4.1	6/22/2021	2.4	2.314	
MW107	5.5-6_	11/23/2021	4.246	0.4554	
MW107	5.5-6.0	1/18/2022	4.246	0.455	
MW107	5.5-6.0	6/21/2022	4.01	0.691	
MW107	5.5-6.0	11/25/2022	4.22	0.481	
MW107	5.5-6.0	3/27/2023	4.246	0.455	
MW107	3.1-4.1_	27/06/2023	2.56	2.154	
MW109	6.5-7.0	3/1/2018	6.733	0.31	
MW109	9.3-9.8	3/1/2018	6.742	0.299	
MW109	6.5-7.0	6/20/2018	6.368	0.675	
MW109	9.3-9.8	6/20/2018	6.381	0.66	
MW109	6.5-7.0	8/26/2019	6.567	0.476	
MW109	6.5-7.0	11/30/2019	6.77	0.273	
MW109	9.3-9.8	6/27/2020	6.415	0.626	
MW109	9.3-9.8	11/18/2020	6.755	0.286	
MW109	9.3-9.8	6/22/2021	6.473	0.568	
MW109	6.5-7_	11/24/2021	6.702	0.3406	
MW109	6.5-7.0	1/18/2022	6.702	0.341	
MW109	6.5-7.0	6/21/2022	6.17	0.873	
MW109	6.5-7.0	11/25/2022	6.6	0.443	
MW109	6.5-7.0	3/27/2023	6.702	0.341	
MW109	6.5-7_	27/06/2023	4.659	2.384	
MW110	7.5-8.0	3/1/2018	7.951	0.316	
MW110	9.0-9.5	3/1/2018	7.966	0.315	
MW110	7.5-8.0	6/20/2018	7.7	0.567	
MW110	9.0-9.5	6/20/2018	7.715	0.566	
MW110	7.5-8.0	8/26/2019	7.862	0.405	
MW110	9.0-9.5	11/28/2019	8	0.281	
MW110	9.0-9.5	6/26/2020	7.705	0.576	
MW110	9.0-9.5	11/18/2020	7.872	0.409	
MW110	9.0-9.5	6/22/2021	7.78	0.501	
MW110	9-9.5_	11/24/2021	7.984	0.2967	
MW110	9.0-9.5	1/18/2022	7.984	0.297	
MW110	7.5-8.0	6/21/2022	7.4	0.867	
MW110	7.5-8.0	11/25/2022	7.285	0.982	
MW110	9.0-9.5	3/27/2023	7.984	0.297	
MW110	9-9.5_	27/06/2023	7.915	0.366	
MW111	10.5-11.0	3/3/2018	8.442	0.386	
MW111	8.5-9.0	3/3/2018	8.431	0.385	
MW111	10.5-11.0	6/17/2018	8.412	0.416	

Location ID	Screen Interval Multilevel Well	Date Time	Water Depth (mbTOC)	Elevation (mAHD)	Comments
MW111	8.5-9.0	6/17/2018	8.427	0.389	
MW111	8.5-9.0	10/8/2018	8.607	0.209	
MW111	8.5-9.0	8/22/2019	8.46	0.356	
MW111	8.5-9.0	11/28/2019	7.6	1.216	
MW111	10.5-11.0	6/26/2020	8.353	0.475	
MW111	10.5-11.0	11/18/2020	8.495	0.333	
MW111	10.5-11.0	6/22/2021	8.374	0.454	
MW111	10.5-11_	11/23/2021	8.543	0.2849	
MW111	10.5-11.0	1/18/2022	8.543	0.285	
MW111	10.5-11.0	6/21/2022	8.14	0.688	
MW111	8.5-9.0	11/25/2022	8.36	0.456	
MW111	10.5-11.0	3/27/2023	8.543	0.285	
MW111	8.5-9_	27/06/2023	8.3	0.516	
MW112	2.0-3.0	3/3/2018	2.684	0.399	
MW112	4.5-5.0	3/3/2018	2.678	0.386	
MW112	6.5-7.0	3/3/2018	2.609	0.412	
MW112	8.5-9.0	3/3/2018	2.694	0.405	
MW112	2.0-3.0	6/17/2018	2.59	0.494	
MW112	4.5-5.0	6/17/2018	2.59	0.474	
MW112	6.5-7.0	6/17/2018	2.543	0.478	
MW112	8.5-9.0	6/17/2018	2.627	0.472	
MW112	4.5-5.0	11/28/2019	2.8	0.264	
MW112	4.5-5.0	6/26/2020	2.62	0.444	
MW112	4.5-5.0	11/18/2020	2.66	0.404	
MW112	4.5-5.0	6/22/2021			No SWL recorded
MW112	4.5-5_	11/23/2021	2.592	0.4716	
MW112	4.5-5.0	1/18/2022	2.592	0.472	
MW112	4.5-5.0	6/21/2022	2.375	0.689	
MW112	2.0-3.0	11/24/2022	2.63	0.454	
MW112	4.5-5.0	3/27/2023	2.592	0.472	
MW112	4.5-5_	27/06/2023	2.54	0.524	
MW113	2.5-3.5	3/1/2018	2.672	0.298	
MW113	5.0-5.5	3/1/2018	2.586	0.325	
MW113	7.0-7.5	3/1/2018	2.614	0.328	
MW113	2.5-3.5	6/17/2018	2.473	0.497	
MW113	5.0-5.5	6/17/2018	2.246	0.665	
MW113	7.0-7.5	6/17/2018	2.475	0.467	
MW113	2.5-3.5	11/28/2019	2.7	0.27	
MW113	2.5-3.5	6/25/2020	2.57	0.4	
MW113	2.5-3.5	11/18/2020	2.58	0.39	
MW113	2.5-3.5	6/22/2021	2.475	0.495	
MW113	2.5-3.5_	11/23/2021	2.643	0.327	
MW113	2.5-3.5	1/18/2022	2.643	0.327	
MW113	2.5-3.5	6/21/2022	2.22	0.75	
MW113	2.5-3.5	11/24/2022	2.51	0.46	
MW113	2.5-3.5	3/27/2023	2.643	0.327	
MW113	2.5-3.5_	27/06/2023	2.56	0.41	
MW114	2.0-3.0	2/28/2018	2.657	0.279	
MW114	4.5-5.0	2/28/2018	2.662	0.29	
MW114	6.5-7.0	2/28/2018	2.697	0.27	
MW114	8.5-9.0	2/28/2018	2.772	0.213	
MW114	2.0-3.0	6/17/2018	2.462	0.474	
MW114	4.5-5.0	6/17/2018	2.488	0.464	
MW114	6.5-7.0	6/17/2018	2.504	0.463	
MW114	8.5-9.0	6/17/2018	2.613	0.372	
MW114	2.0-3.0	11/28/2019	2.7	0.236	
MW114	2.0-3.0	6/25/2020	2.53	0.406	
MW114	2.0-3.0	11/18/2020	2.64	0.296	
MW114	2.0-3.0	6/22/2021	2.5	0.436	
MW114	2-3_	11/23/2021	2.501	0.4346	
MW114	2.0-3.0	1/18/2022	2.501	0.435	
MW114	2.0-3.0	6/21/2022	2.23	0.706	
MW114	4.5-5.0	11/24/2022	2.53	0.422	
MW114	2.0-3.0	3/27/2023	2.501	0.435	
MW114	4.5-5_	27/06/2023	2.61	0.342	
MW115	2.3-2.8	3/2/2018	2.378	0.25	
MW115	4.5-5.0	3/2/2018	2.412	0.23	
MW115	6.5-7.0	3/2/2018	2.411	0.268	
MW115	8.5-9.0	3/2/2018	2.323	0.368	
MW115	2.3-2.8	6/17/2018	2.294	0.334	
MW115	4.5-5.0	6/17/2018	2.325	0.317	
MW115	6.5-7.0	6/17/2018	2.304	0.375	
MW115	8.5-9.0	6/17/2018	2.175	0.516	
MW115	2.3-2.8	11/28/2019	2.46	0.168	
MW115	2.3-2.8	6/25/2020	2.308	0.32	
MW115	4.5-5.0	11/18/2020	2.41	0.232	
MW115	8.5-9.0	6/22/2021	2.36	0.331	
MW115	2-3_	11/23/2021	2.568	0.0601	
MW115	2.3-2.8	1/18/2022	2.568	0.06	
MW115	2.3-2.8	6/21/2022	2.03	0.598	
MW115	2.3-2.8	11/24/2022	2.09	0.538	
MW115	2.3-2.8	3/27/2023	2.568	0.06	
MW115	2-3_	27/06/2023	2.41	0.218	
MW116	1.2-2.2	3/3/2018	2.202	0.186	
MW116	4.5-5.0	3/3/2018	2.17	0.219	
MW116	6.5-7.0	3/3/2018	2.243	0.188	
MW116	8.5-9.0	3/3/2018	2.235	0.207	
MW116	1.2-2.2	6/17/2018	2.137	0.251	
MW116	4.5-5.0	6/17/2018	2.148	0.24	
MW116	6.5-7.0	6/17/2018	2.073	0.358	
MW116	8.5-9.0	6/17/2018	2.093	0.349	
MW116	1.2-2.2	11/28/2019			Dry
MW116	4.5-5.0	11/28/2019	2.4	-0.011	
MW116	4.5-5.0	6/25/2020	2.21	0.179	
MW116	1.2-2.2	11/18/2020			Bore locked
MW116	4.5-5.0	6/22/2021	2.36	0.029	
MW116	4.5-5.0_	11/23/2021	2.277	0.1115	
MW116	4.5-5.0	1/18/2022	2.277	0.111	
MW116	1.2-2.2	11/23/2022	1.76	0.628	
MW116	4.5-5.0	3/27/2023	2.277	0.111	
MW116	4.5-5_	27/06/2023	2.06	0.329	
MW117	2.0-2.5	3/3/2018	2.371	0.22	
MW117	4.0-4.5	3/3/2018	2.474	0.181	

Location ID	Screen Interval Multilevel Well	Date Time	Water Depth (mbTOC)	Elevation (mAHD)	Comments
MW117	6.0-6.5	3/3/2018	2.542	0.188	
MW117	7.4-7.9	3/3/2018	2.536	0.226	
MW117	2.0-2.5	6/17/2018	2.419	0.172	
MW117	4.0-4.5	6/17/2018	2.472	0.183	
MW117	6.0-6.5	6/17/2018	2.561	0.169	
MW117	7.4-7.9	6/17/2018	2.586	0.176	
MW117	4.0-4.5	11/28/2019	2.7	-0.045	
MW117	4.0-4.5	6/23/2020	2.295	0.36	
MW117	4.0-4.5	11/17/2020	2.57	0.085	
MW117	6.0-6.5	6/22/2021	2.32	0.41	
MW117	-	11/23/2021	2.503	0.1524	QC110 lost in transit to lab
MW117	4.0-4.5	1/18/2022	2.503	0.152	
MW117	2.0-2.5	6/21/2022			Not recorded
MW117	2.0-2.5	11/23/2022	1.85	0.741	
MW117	4.0-4.5	3/27/2023	2.503	0.152	
MW117	4-4.5_	27/06/2023	2.4	0.255	
MW118	-	2/28/2018	4.297	0.203	
MW118	-	6/13/2018	4.067	0.433	
MW118	-	8/26/2019	4.412	0.088	
MW118	-	11/28/2019	4.2	0.3	
MW119	-	3/1/2018	3.37	0.137	
MW119	-	6/17/2018	3.181	0.326	
MW119	-	8/26/2019	3.482	0.025	
MW119	-	11/28/2019	3.5	0.007	
MW119	-	6/25/2020	3.32	0.187	
MW119	-	11/17/2020	3.45	0.057	
MW119	-	6/23/2021	3.12	0.387	
MW119	-	11/23/2021	3.35	0.1569	
MW119	-	1/18/2022	3.35	0.157	
MW119	-	6/21/2022	2.8	0.707	
MW119	-	11/24/2022	3.32	0.187	
MW119	-	3/27/2023	3.35	0.157	
MW119		27/06/2023	3.29	0.217	
MW123	-	2/28/2018	0.684	-0.148	
MW123	-	6/15/2018	0.415	0.121	
MW123	-	11/28/2019	0.8	-0.264	
MW123	-	6/25/2020	0.615	-0.079	
MW123	-	11/18/2020	0.77	-0.234	
MW123	-	6/22/2021			Access denied due to Base activities/Asbestos remediation. Not sampled
MW123	-	11/23/2021	0.48	0.0556	
MW123	-	1/18/2022	0.48	0.056	
MW123	-	6/21/2022			No access
MW123	-	3/27/2023	0.48	0.056	
MW129	5.5-6.0	11/28/2019	1.87	0.135	
MW129	5.5-6.0	6/23/2020	2.045	-0.04	
MW129	1.5-2.0	11/17/2020	1.806	0.22	
MW129	1.5-2.0	6/22/2021	1.75	0.276	
MW129	-	11/23/2021	1.843	0.1826	
MW129	1.5-2.0	1/18/2022	1.843	0.183	
MW129	1.5-2.0	6/21/2022	1.55	0.476	
MW129	1.5-2.0	11/23/2022	1.74	0.286	
MW129	1.5-2.0	3/27/2023	1.843	0.183	
MW129	1.5-2_	27/06/2023	1.66	0.366	
MW130	3.4-3.9	11/28/2019	1.97	0.085	
MW130	1.4-1.9	6/23/2020	1.72	0.296	
MW130	1.4-1.9	11/17/2020	1.843	0.173	
MW130	1.4-1.9	6/22/2021	1.701	0.315	
MW130	-	11/23/2021	1.762	0.2935	
MW130	3.4-3.9	1/18/2022			
MW130	1.4-1.9	6/21/2022	1.5	0.516	
MW130	1.4-1.9	11/23/2022	1.71	0.306	
MW130	3.4-3.9	3/27/2023			
MW130	3.4-3.9_	27/06/2023	1.925	0.13	
MW134	-	11/28/2019	10.07	0.009	
MW134	-	6/23/2020	9.9	0.179	
MW134	-	11/17/2020	9.981	0.098	
MW134	-	6/22/2021	9.75	0.329	
MW134	-	11/23/2021	9.859	0.2196	
MW134	-	1/18/2022	9.859	0.22	
MW134	-	6/21/2022	9.42	0.659	
MW134	-	11/23/2022	9.9	0.179	
MW134	-	3/27/2023	9.859	0.22	
MW134		27/06/2023	9.68	0.399	
MW202	-	3/2/2016	7.83	0.239	
MW202	-	3/3/2018	7.652	9.554	
MW202	-	6/20/2018	7.48	9.554	
MW202	-	11/28/2019	7.7	0.369	
MW202	-	6/26/2020	7.505	0.564	
MW202	-	11/18/2020	7.34	0.729	
MW202	-	6/22/2021	7.586	0.483	
MW202	-	11/23/2021	6.598	1.471	
MW202	-	1/18/2022	6.598	1.471	
MW202	-	6/21/2022	7.2	0.869	
MW202	-	11/25/2022	7.03	1.039	
MW202	-	3/27/2023	6.598	1.471	
MW202		27/06/2023	7.5	0.569	
MW210	-	5/19/2011	2.19	0.69	
MW210	-	2/28/2018	2.548	4.1	
MW210	-	6/13/2018	2.363	4.1	
MW210	-	11/28/2019			Dipper not working
MW210	-	3/18/2020	2.61	0.26	
MW210	-	6/26/2020	2.49	0.373	
MW210	-	11/17/2020	2.585	0.278	
MW210	-	6/22/2021	2.325	0.538	
MW210	-	11/23/2021	2.51	0.353	
MW210	-	1/18/2022	2.51	0.353	
MW210	-	6/21/2022	1.9	0.963	
MW210	-	11/25/2022	2.49	0.373	
MW210	-	3/27/2023	2.51	0.353	
MW210		27/06/2023	2.48	0.383	
MW212	-	5/19/2011	2.83	0.7	
MW212	-	3/3/2018	2.175	4.85	
MW212	-	6/2/2018	3.075	4.85	

Location ID	Screen Interval Multilevel Well	Date Time	Water Depth (mbTOC)	Elevation (mAHD)	Comments
MW212	-	10/13/2018	3.288	0.225	
MW212	-	8/23/2019	3.258	0.255	
MW212	-	11/28/2019	3.305	0.208	
MW212	-	3/18/2020	3.25	0.28	
MW212	-	6/26/2020	3.13	0.383	
MW212	-	11/17/2020	3.24	0.273	
MW212	-	6/22/2021	2.95	0.563	
MW212	-	11/23/2021	2.99	0.523	
MW212	-	1/18/2022	2.99	0.523	
MW212	-	6/21/2022	2.575	0.938	
MW212	-	11/25/2022	3.14	0.373	
MW212	-	3/27/2023	2.99	0.523	
MW212		27/06/2023	3.12	0.393	
MW213	-	5/19/2011	4.05	0.26	
MW213	-	6/16/2018	4.282	0.208	
MW213	-	10/6/2018	4.395	-0.102	
MW213	-	8/29/2019	4.45	-0.157	
MW213	-	11/28/2019	4.6	-0.11	
MW213	-	6/25/2020	4.2	0.29	
MW213	-	11/18/2020	4.385	0.105	
MW213	-	6/23/2021	4.19	0.3	
MW213	-	11/23/2021	4.47	0.02	Not enough water to fill hydrasleeve.
MW213	-	1/18/2022	4.47	0.02	Not enough water to fill hydrasleeve.
MW213	-	6/21/2022	3.84	0.65	
MW213	-	11/23/2022	4.43	0.06	
MW213	-	3/27/2023	4.47	0.02	Not enough water to fill hydrasleeve.
MW213		27/06/2023	4.37	0.12	
MW214	-	5/8/2011	3.87	0.64	
MW214	-	2/27/2018	4.28	0.01	
MW214	-	6/16/2018	4.079	0.211	
MW214	-	10/9/2018	4.592	-0.099	
MW214	-	8/29/2019	4.559	-0.066	
MW214	-	11/28/2019	4.38	-0.09	
MW214	-	6/22/2021	3.74	0.55	
MW214	-	11/23/2021	4.3	-0.01	Not enough water to fill hydrasleeve.
MW214	-	1/18/2022	4.3	-0.01	
MW214	-	6/21/2022	3.68	0.61	
MW214	-	11/23/2022	4.2	0.09	
MW214	-	3/27/2023	4.3	-0.01	
MW214		27/06/2023	3.315	0.975	
MW217	-	5/8/2011	3.11	0.55	
MW217	-	3/2/2018	3.432	0.226	
MW217	-	6/18/2018	3.397	0.261	
MW217	-	11/28/2019	3.6	0.058	
MW217	-	6/26/2020	3.4	0.258	
MW217	-	11/18/2020	3.53	0.128	
MW217	-	6/22/2021	3.6	0.058	
MW217	-	11/23/2021	2.9	0.758	
MW217	-	1/18/2022	2.9	0.758	
MW217	-	6/21/2022	3.06	0.598	
MW217	-	11/24/2022	4.5	-0.842	
MW217	-	3/27/2023	2.9	0.758	
MW217		27/06/2023			Bore blocked with roots at 3.28 mbtoc
MW218	-	5/8/2011	4.61	0.53	
MW218	-	3/2/2018	4.938	0.199	
MW218	-	6/18/2018	4.855	0.282	
MW218	-	11/28/2019	5.1	0.037	
MW218	-	6/26/2020	4.86	0.277	
MW218	-	11/17/2020	4.997	0.14	
MW218	-	6/22/2021	4.81	0.327	
MW218	-	11/23/2021	4.92	0.217	
MW218	-	1/18/2022	4.92	0.217	
MW218	-	6/21/2022	4.58	0.557	
MW218	-	11/24/2022	4.9	0.237	
MW218	-	3/27/2023	4.92	0.217	
MW218		27/06/2023	4.959	0.178	

		Field Parameters					
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	TDS (Field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mg/L	mV
Location ID	Date						
MW003	28/02/2018	27.8	7.4	0.06	27,632		-67.4
MW003	15/06/2018	28.9	7.37	0.03	27,989		-122.4
MW003	26/06/2020	26.8	7.41	1.29	27,566		-143.2
MW003	17/11/2020	29.4	6.21	1.16	28,147		-18.8
MW003	22/06/2021	25.6	7.6	2.05	30,232		-14.8
MW004	11/23/2021	28.3	7.49	0.01	17164		-187.6
MW004	25/11/2022	26	7.78	0.82	3245	2114	-277.5
MW004	6/27/2023	24.6	7.63	2.07	5227	3393	-174.6
MW008	28/02/2018	27.6	7.45	0.03	27,218		-81.3
MW008	15/06/2018	29.2	7.33	0.11	14,954		-122.3
MW008	9/10/2018	27.7	7.83	6.63	26,282		
MW008	23/08/2019	27.5	7.36	0.09	14,748		
MW008	30/11/2019	30.5	7.89		1,397.50		7.17
MW008	17/03/2020	32.3	7.41	0.79	30,004		
MW008	26/06/2020	26.1	7.39	1.29	17,516		-136.2
MW008	17/11/2020	30.7	5.8	1.52	35,426		21.2
MW008	22/06/2021	26.1	7.62	1.11	31,499		-69.8
MW008	11/23/2021	28.1	7.58	0.7	30158		-43.9
MW008	18/01/2022	28.1	7.58	0.7	30,158		-43.9
MW008	21/06/2022	25.4	7.32	1.06	30,870		9.1
MW008	25/11/2022	26.9	7.54	1.1	26358	17123	-181.7
MW017	28/02/2018	29.7	7.26	0.37	28,441		-123.7
MW017	16/06/2018	28.8	7.23	0.03	30,509		-182.5
MW017	5/10/2018	28	7.23	0.23	22,602		
MW017	28/11/2019	27.7	7.36	3.12	18,261		-33.6
MW017	25/06/2020	29.1	7.24	1.52	25,362		-187
MW017	18/11/2020	27	7.38	2.05	23,984		-153.7
MW017	22/06/2021	27.3	7.48	1.82	16,215		7.8
MW017	11/23/2021	28.9	7.92	1.63	27429		-164
MW017	18/01/2022	28.9	7.92	1.63	27,429		-164
MW017	21/06/2022	27.4	7.29	0.69	25,663		11.3
MW017	24/11/2022	25.5	7.39	1.45	26380	17058	-150.7
MW017	6/27/2023	26.9	7.3	2.93	17546	11404	-6.9
MW019	23/02/2018	30	7.27	0.11	14,900		-103.2
MW019	16/06/2018	29.1	7.24	0.01	28,517		-153.5
MW019	11/10/2018	27.6	7.3	0	20,312		
MW019	27/08/2019	26.2	7.03	0.1	27,424		
MW019	17/03/2020	30.8	7.22	0.66	26,575		
MW019	25/06/2020	26	7.11	1.04	24,557		-99.1
MW019	18/11/2020	26.5	6.9	0.85	31,502		-126.3
MW019	23/06/2021	25.3	7.27	1.89	21,372		-57.2
MW019	11/23/2021	25.8	7.3	1.85	21802		118.9
MW019	18/01/2022	25.8	7.3	1.85	21,802		118.9
MW019	21/06/2022	27	7.36	0.92	22,708		47.1
MW019	23/11/2022	27.2	7.36	0.58	43255	28116	-148.1
MW019	6/27/2023	23	7.45	3.98	28060	18238	-46.1
MW027	23/02/2018	29.4	7.14	0.14	20,910		-62.3
MW027	16/06/2018	29.5	7.2	0.08	26,573		-177
MW027	11/10/2018	28.4	7.41	0.22	21,131		
MW027	27/08/2019	28.7	7.12	0.09	23,065		
MW027	28/11/2019	28.8	7.37	4.58	16,884		4.9
MW027	25/06/2020	26.2	7.13	1.3	24,953		-47.4
MW027	18/11/2020	28	7.14	1.01	28,811		-116.9
MW027	23/06/2021	24	6.62	0.83	26,933		-228.8
MW027	11/23/2021	27.6	7.32	1.9	12126		87.1
MW027	18/01/2022	27.6	7.32	1.9	12,126		87.1
MW027	21/06/2022	26.9	7.26	1.92	12,460		72.1
MW027	23/11/2022	29.2	7.44	0.49	27138	17634	-122
MW027	6/27/2023	26.1	-6.3	1.7	27534	17902	-0.1
MW101	28/02/2018	29.8	7.24	0.19	21,519		-270.2
MW101	16/06/2018	29.3	7.26	0.06	17,762		-259.8
MW101	16/10/2018	27.5	7.53	0.05	19,640		
MW101	27/08/2019	26.4	7.11	0	23,481		
MW101	25/06/2020	30.8	7.16	0.59	27,221		-218.4
MW101	18/11/2020	28.7	7.11	4.09	27,325		-156.9
MW101	23/06/2021	24.6	7.38	0.98	12,612		-263.4
MW101	11/23/2021	29.6	7.3	0.56	20043		-231.4
MW101	18/01/2022	29.6	7.3	0.56	20,043		-231.4
MW101	21/06/2022	26.2	8	0.66	3,722		-238.9
MW101	24/11/2022	26.4	7.28	0.62	20773	13504	-308.9
MW101	6/27/2023	25.9	7.12	1.7	28450	18502	-184.5
MW102	28/02/2018	30.4	7.4	0.36	15,358		-31.2
MW102	16/06/2018	29.5	7.2	0.09	17,975		-73.2
MW102	27/08/2019	28.2	7.37	4.63	26,341		
MW102	25/06/2020	27.8	7.17	0.66	27,697		-159.7
MW102	18/11/2020	28.1	7.11	0.81	26,164		-93.2
MW102	22/06/2021	26.5	7.84	1.99	7,129		74.5
MW102	11/23/2021	28	7.31	0.64	24717		-80.1
MW102	18/01/2022	28	7.31	0.64	24,717		-80.1
MW102	21/06/2022	26.8	7.76	1.54	7,942		-85.6
MW102	24/11/2022	26.8	7.52	0.93	13879	9022	-176
MW102	6/27/2023	27.4	7.22	1.52	25671	16683	-20.1
MW103	28/02/2018	29.8	7.41	0.34	12,916		-13
MW103	16/06/2018	29.3	7.06	0.11	16,267		-83.9
MW103	25/08/2019	28.1	7.24	0.12	10,101		
MW103	28/11/2019	28.2	7.57	2.79	12,896		-32.9
MW103	25/06/2020	27.1	7.26	1.07	19,519		-82.7
MW103	18/11/2020	28.8	7.22	1.27	24,780		-118
MW103	22/06/2021	25.6	7.48	1.44	15,212		70.7
MW103	11/23/2021	28.9	7.32	0.79	22702		-42.2
MW103	18/01/2022	28.9	7.32	0.79	22,702		-42.2
MW103	21/06/2022	25.9	7.71	1.32	9,610		37.6
MW103	24/11/2022	26.6	7.47	0.82	17872	11634	-167
MW103	6/27/2023	27.3	7.29	1.04	22112	14377	-26.1
MW104	28/02/2018	32.5	7.56	0.55	14,530		-218.3
MW104	28/02/2018	30.7	7.34	0.58	32,008		-173.9
MW104	18/06/2018	28.8	7.56	0.08	16,265		-173
MW104	18/06/2018	29	7.44	0.17	15,296		-95.5
MW104	18/06/2018	28.6	7.33	0.26	31,465		-156.2
MW104	18/06/2018	27.2	7.71	6.14	5,409		-2.2
MW104	28/11/2019	28.5	7.62	2.53	13,371		-39.9
MW104	25/06/2020	29	7.4	1.79	15,518		-182.1
MW104	18/11/2020	27.8	7.62	1.75	17,742		27
MW104	22/06/2021	22.8	7.74	2.37	18,136		46.7
MW104	11/23/2021	29.9	7.62	1.02	18842		-345.7
MW104	18/01/2022	29.9	7.62	1.02	18,842		-345.7
MW104	21/06/2022	26.8	7.82	3.58	5,714		-58.3
MW104	24/11/2022	27.2	7.57	1.11	18296	11909	-320.8
MW104	6/27/2023	26.2	7.39	0.87	18725	12175	-16.5
MW105	3/03/2018	30.9	7.04	0.05	32,660		-284.3
MW105	3/03/2018	30.2	7.37	0.06	27,320		-178.5

		Field Parameters					
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	TDS (Field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mg/L	mV
Location ID	Date						
MW105	3/03/2018	30.7	7.27	0.08	32,590		-257.6
MW105	2/06/2018	29.1	8.81	0.14	30,387		
MW105	2/06/2018	28.7	9.68	0.21	35,675		
MW105	2/06/2018	28.5	9.46	0.23	9,974		
MW105	13/10/2018	28.5	7.41	0	30,165		
MW105	29/08/2019	26.9	7.24	0.1	32,044		
MW105	28/11/2019	29.1	7.4	3.94	31,389		15.4
MW105	26/06/2020	27.8	7.37	1.98	28,761		-131.7
MW105	17/11/2020	33.6	7.42	0.79	42,161		-119.8
MW105	22/06/2021	27.5	7.53	2.54	15,597		-68
MW105	11/23/2021	28.9	7.63	1.05	31853		-55.8
MW105	18/01/2022	28.9	7.63	1.05	31,853		-55.8
MW105	21/06/2022	25.9	7.52	3.41	29,474		55.7
MW105	25/11/2022	27.3	7.48	2.54	30075	19554	-81.8
MW105	6/27/2023	25.9	7.63	1.74	30705	19961	-1.1
MW107	3/03/2018	25.5	8.13	0.25	54,125		-24.5
MW107	3/03/2018	25.2	7.98	2.37	54,044		-9.9
MW107	17/06/2018	27	7.88	0.49	55,010		-146.7
MW107	17/06/2018	27.1	7.85	2.75	55,022		-93.1
MW107	8/10/2018	28.1	7.55	111.8	48,307		
MW107	22/08/2019	27.4	7.19	0.48	18,464		
MW107	30/11/2019	29.1	7.57	3.2	56,570		-406.3
MW107	26/06/2020	26.5	7.44	1.58	54,126		42.9
MW107	17/11/2020	30.3	7.5	1.52	55,033		-2
MW107	22/06/2021	20.3	7.56	4.06	52,872		14.7
MW107	11/23/2021	27.8	7.38	0.71	52824		-243.2
MW107	18/01/2022	27.8	7.38	0.71	52,824		-243.2
MW107	21/06/2022	26.1	7.55	1.87	51,083		50.2
MW107	25/11/2022	24.6	7.5	4.98	49127	31960	-110.7
MW107	6/27/2023	24	7.59	2.36	49300	32038	18.8
MW109	1/03/2018	25.3	7.72	4.71	55,019		-0.5
MW109	26/08/2019	25	7.39	7.1	49,602		
MW109	30/11/2019	29.7	7.57	2.25	59,279		-411
MW109	27/06/2020	25.8	7.51	4.01	53,797		-34.1
MW109	18/11/2020	28.4	7.69	3.09	62,657		-61.7
MW109	22/06/2021	23	7.57	3.69	53,084		74.8
MW109	11/24/2021	26.3	7.74	8.23	48490		5.6
MW109	18/01/2022	26.3	7.74	8.23	48,490		5.6
MW109	21/06/2022	26.7	7.56	4.21	48,963		26.3
MW109	25/11/2022	25.8	7.92	6.43	28479	18511	-106
MW109	6/27/2023	24.9	7.7	2.32	49078	31928	19.7
MW110	1/03/2018	26.6	8.36	4.05	54,447		6.9
MW110	20/06/2018	27.6		1.9	53,473		-156.9
MW110	20/06/2018	27		3.22	27,884		-68.3
MW110	26/08/2019	26.4	7.4	4.9	30,702		
MW110	26/06/2020	27.6	7.42	3.07	51,376		-74.6
MW110	18/11/2020	29.1	7.59	2.1	61,560		-108.1
MW110	22/06/2021	22.3	7.67	3.01	31,422		-28.4
MW110	11/24/2021	26.9	7.63	3.02	27565		-43.2
MW110	18/01/2022	26.9	7.63	3.02	27,565		-43.2
MW110	21/06/2022	26.9	7.6	4.37	43,448		21.1
MW110	25/11/2022	27	7.8	4.38	18569	12060	-108.1
MW110	6/27/2023	23.4	7.75	4.56	20373	13240	18.7
MW111	3/03/2018	27.1	8.23	1.73	52,908		-11.6
MW111	17/06/2018	28.4	7.76	1.57	46,321		1
MW111	17/06/2018	28.2	7.92	1.62	55,172		-111.9
MW111	8/10/2018	31.5	7.9	2.65	41,699		
MW111	22/08/2019	28.4	7.41	2.22	46,689		
MW111	28/11/2019	29.7	7.58	5.6	21,874		-54
MW111	26/06/2020	27.8	7.42	3.38	45,245		21.1
MW111	18/11/2020	28.9	7.65	1.76	57,640		-226.6
MW111	22/06/2021	21.3	7.78	0.55	53,150		-313.6
MW111	11/23/2021	30.2	7.34	0.39	53016		-281.8
MW111	18/01/2022	30.2	7.34	0.39	53,016		-281.8
MW111	21/06/2022	25.8	7.38	2.56	27,997		49.3
MW111	25/11/2022	25.3	7.82	3.93	38870	25266	-105.2
MW111	6/27/2023	25.2	7.59	2.48	40580	26377	21.9
MW112	3/03/2018	26.5	7.73	1.02	55,225		-13.7
MW112	3/03/2018	26.8	7.82		54,980		-138.2
MW112	3/03/2018	26.9	7.76		54,249		-32.3
MW112	17/06/2018	27.7	7.79	0.03	54,437		-132.2
MW112	17/06/2018	27.6	7.76	0.09	55,159		-243.3
MW112	17/06/2018	27.9	7.97	1.11	34,429		-45.7
MW112	17/06/2018	27.6	7.78	1.29	55,206		-50.5
MW112	28/11/2019	28.4	7.5	1.51	55,973		-7.5
MW112	26/06/2020	27.5	7.5	1.68	51,703		-174.9
MW112	18/11/2020	27.3	4.57	1.96	59,319		244.2
MW112	22/06/2021	20.6	7.68	4.43	53,824		89.4
MW112	11/23/2021	28.7	7.74	2.63	53831		17.4
MW112	18/01/2022	28.7	7.74	2.63	53,831		17.4
MW112	21/06/2022	25.9	7.79	3.53	53,371		50
MW112	24/11/2022	28.4	7.8	2.4	17625	11462	-100
MW112	6/27/2023	23.4	7.9	3.97	49736	32324.5	23.5
MW113	1/03/2018	26.5	7.61	0.01	55,349		-127.7
MW113	1/03/2018	26.4	7.68	0.23	55,184		-67.2
MW113	17/06/2018	27.6	7.63	0.21	56,716		-250.2
MW113	17/06/2018	27.8	7.73	0.32	56,677		-272.4
MW113	17/06/2018	28.3	7.7	1.27	56,219		-27.5
MW113	28/11/2019	30.5	7.22	9.91	1,333		1,058
MW113	25/06/2020	25.4	7.82	2.92	53,514		-6.3
MW113	18/11/2020	28.5	7.72	1.03	584		172.3
MW113	22/06/2021	25.7	7.67	4.27	29,895		135.3
MW113	11/23/2021	28.6	7.61	5.39	29068		-22.5
MW113	18/01/2022	28.6	7.61	5.39	29,068		-22.5
MW113	21/06/2022	26.5	7.83	3.14	33,708		-95.1
MW113	24/11/2022	28.6	7.9	3.72	27940	18169	-98
MW113	6/27/2023	23.2	7.74	2.6	36966	24025	-91.8
MW114	28/02/2018	26.7	7.64	0.22	53,127		-92.2
MW114	28/02/2018	26.6	7.66	0.5	55,911		-129
MW114	28/02/2018	27.1	7.72		53,840		70.9
MW114	17/06/2018	27.3	7.63	0.36	55,807		-163.7
MW114	17/06/2018	29.3	7.79	0.39	5,948		-96.5
MW114	17/06/2018	27.9	7.59	2.04	55,185		48.3
MW114	17/06/2018	27.8	7.66	2.52	56,159		-114
MW114	28/11/2019	30.3	7.52	8.83	4,800		1,070
MW114	25/06/2020	25.1	7.82	1	54,412		-112.6
MW114	18/11/2020	28.3	7.61	2.18	54,934		138
MW114	22/06/2021	27.2	7.81	5.38	30,347		133.5
MW114	11/23/2021	29.4	7.58	5.17	29104		-18.2
MW114	18/01/2022	29.4	7.58	5.17	29,104		-18.2
MW114	21/06/2022	26.6	7.82	7.7	682		-81.7
MW114	24/11/2022	29.2	7.78	1.09	54877	35676	-108.6
MW114	6/27/2023	23.6	7.59	1.5	54201	35230	-101.9

		Field Parameters					
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	TDS (Field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mg/L	mV
Location ID	Date						
MW115	2/03/2018	26.9	7.76	0.09	50,980		-88.2
MW115	2/03/2018	27	7.63	0.17	54,894		-98.7
MW115	2/03/2018	26.1	7.69	0.57	53,980		-93.6
MW115	17/06/2018	28.5	6.98	0.16	51,200		-96.6
MW115	17/06/2018	28.2	7	0.16	51,487		-139.9
MW115	17/06/2018	27.8	7.01	0.19	53,115		-120.9
MW115	17/06/2018	27.6	6.98	0.28	53,062		-149.7
MW115	28/11/2019	27.5	7.46	2.02	26,039		28.1
MW115	25/06/2020	24.6	7.73	2.07	51,870		31.3
MW115	18/11/2020	28.7	7.57	1.35	64,480		156.8
MW115	22/06/2021	23.8	7.88	4.73	42,122		130.5
MW115	11/23/2021	31.4	8.13	4.31	16767		3.7
MW115	18/01/2022	31.4	8.13	4.31	16,767		3.7
MW115	21/06/2022	26.7	7.74	2.36	41,060		-125.9
MW115	24/11/2022	29.2	7.72	2.43	29217	18993	-107.5
MW115	6/27/2023	20.5	7.98	4.25	28816	18607	-70.8
MW116	3/03/2018	29.7	7.59	0.17	45,420		-145.2
MW116	3/03/2018	32	7.6	0.18	32,520		-174.9
MW116	3/03/2018	28.7	7.7	1.01	34,355		-129.8
MW116	17/06/2018	27.8	6.87	0.38	55,339		-23.5
MW116	17/06/2018	27	6.87	0.76	53,955		28.5
MW116	17/06/2018	27.3	6.89	1.58	56,151		-7.7
MW116	17/06/2018	26.5	6.89	3.81	47,409		39.6
MW116	28/11/2019	24.8	7.54	7.1			
MW116	25/06/2020	21.9	7.91	2.92	50,898		40.8
MW116	22/06/2021	24.6	7.86	4.37	36,072		146.9
MW116	11/23/2021	24.6	7.81	4.83	55074		54.3
MW116	18/01/2022	24.6	7.81	4.83	55,074		54.3
MW116	21/06/2022	25.5	7.78	2.88	50,680		-102.6
MW116	23/11/2022	23.6	8.19	2.88	46024	29913	41.5
MW116	6/27/2023	19	7.78	4.88	52011	33812	-54.1
MW117	3/03/2018	26	7.56	0.19	49,600		-132.2
MW117	3/03/2018	25.7	7.64	0.84	53,600		-113.8
MW117	3/03/2018	25.6	7.6	0.9	53,500		-107.3
MW117	17/06/2018	27.1	6.96	1.14	55,731		24.3
MW117	17/06/2018	26.9	6.96	1.41	55,272		30.6
MW117	17/06/2018	28.3	6.98	2.03	56,174		33.1
MW117	17/06/2018	28.3	7.02	2.73	55,138		41.2
MW117	28/11/2019	23.8	7.9	6.43	1,468		32.2
MW117	23/06/2020	28.2	7.45	2.74	53,907		-88.9
MW117	17/11/2020	28.7	7.73	4.1	54,013		191.2
MW117	22/06/2021	24.1	7.72	3.22	38,020		139.9
MW117	11/23/2021	25.6	8.33	6.96	6465		-26.1
MW117	18/01/2022	25.6	8.33	6.96	6,465		-26.1
MW117	21/06/2022	24.9	7.82	3.91	8,724		-154.2
MW117	23/11/2022	31.7	8.72	3.15	42888	27893	106.6
MW117	6/27/2023	21.2	8.04	5.59	6774	4402	-67.5
MW119	1/03/2018	33.1	7.37	0.13	19,840		-144.8
MW119	17/06/2018	29.4	7.43	0.17	25,789		-111.9
MW119	26/08/2019	28.4	7.3	0.12	29,882		
MW119	28/11/2019	28.6	7.51	2.87	17,077		-39.3
MW119	25/06/2020	27.4	7.35	1.64	23,063		-110
MW119	17/11/2020	2.4	8.34	1.95	98,983		-94.8
MW119	23/06/2021	25.2	7.63	1.53	27,112		-117.1
MW119	11/23/2021	28.7	7.44	0.94	25175		-26.2
MW119	18/01/2022	28.7	7.44	0.94	25,175		-26.2
MW119	21/06/2022	26.6	7.52	1.64	24,709		-158.6
MW119	24/11/2022	26.3	7.69	1.48	25201	16357	-205.4
MW119	6/27/2023	27.3	7.43	0.77	18825	12278.5	-40.4
MW123	28/02/2018	31.1	7.31	0.05	60,500		-210.6
MW123	15/06/2018	28.2	7.33	0.04	64,541		-133.6
MW123	28/11/2019	28.9	7.2	1.8	34,262		157
MW123	25/06/2020	27.6	7.13	0.94	59,337		-107.8
MW123	18/11/2020	28.1	7.22	0.86	81,271		-80.5
MW123	11/23/2021	28.3	7.35	0.42	70621		-56.7
MW123	18/01/2022	28.3	7.35	0.42	70,621		-56.7
MW129	28/11/2019	27.2	7.68	4.17	47,120		45.6
MW129	23/06/2020	27.3	7.45	3.55	44,189		-13.9
MW129	17/11/2020	29.4	6.93	1.1	53,939		-106.8
MW129	22/06/2021	23.2	7.33	1.73	26,907		57.8
MW129	11/23/2021	28.5	7.37	2	49658		-103.3
MW129	18/01/2022	28.5	7.37	2	49,658		-103.3
MW129	21/06/2022	25.2	7.39	2.69	50,987		-10.5
MW129	23/11/2022	27.1	7.4	2.31	52746	34293	-104.4
MW129	6/27/2023	21	7.66	3.63	43907	28535	14
MW130	28/11/2019	27.4	7.22	2	51,288		-107.5
MW130	23/06/2020	25.1	7.47	1.69	49,022		17.1
MW130	17/11/2020	28.2	7.22	2.61	50,748		4.5
MW130	22/06/2021	21.9	7.32	3.5	31,585		105.3
MW130	11/23/2021	27.5	7.51	3.9	48679		62
MW130	18/01/2022	27.5	7.51	3.9	48,679		62
MW130	21/06/2022	25	7.38	2.85	51,622		21.9
MW130	23/11/2022	26.6	7.35	3.57	44185	28725	-84
MW130	6/27/2023	21.1	7.27	3.61	44033	28613.5	12
MW134	28/11/2019	29.8	7.34	1.76	45,162		-32.7
MW134	23/06/2020	27.1	7.4	2.1	41,773		120.5
MW134	17/11/2020	27.4	7.12	1.86	41,465		41.8
MW134	22/06/2021	22.4	7.41	1.38	43,477		63.3
MW134	11/23/2021	30.2	7.45	1.74	43202		41.5
MW134	18/01/2022	30.2	7.45	1.74	43,202		41.5
MW134	21/06/2022	27.1	7.48	2.12	40,802		19
MW134	23/11/2022	27.5	7.42	1.44	42669	27737	-96.9
MW134	6/27/2023	22.2	7.42	2.97	45672	29698	29.2
MW202	3/03/2018	27.4	7.64	0.84	43,896		-152.8
MW202	28/11/2019	30.2	7.4	3.06	20,936		-167
MW202	26/06/2020	27.5	7.36	2.41	43,602		-133.6
MW202	18/11/2020	28.6	7.7	1.08	47,777		-136.6
MW202	22/06/2021	24.4	7.72	4.8	27,869		116.6
MW202	11/23/2021	28.1	7.01	0.02	42415		-326.3
MW202	18/01/2022	28.1	7.01	0.02	42,415		-326.3
MW202	21/06/2022	27.5	7.56	2.4	45,276		-262.2
MW202	25/11/2022	26.8	7.53	2.75	24792	16127	-206.6
MW202	6/27/2023	23.3	7.56	1.82	41866	27215.5	21.7
MW210	28/02/2018	27.2	7.29	0.06	26,097		-73.8
MW210	13/06/2018	28.5	7.38	0.37	24,805		-144.9
MW210	28/11/2019	28.5	7.37	3.51	25,060		12.5
MW210	18/03/2020	30.5	7.45	2.43	24,296		
MW210	26/06/2020	27.3	7.36	1.5	23,993		-112.4
MW210	17/11/2020	29.2	7.9	1.52	30,426		-73.7
MW210	22/06/2021	26.9	7.44	0.78	27,551		20.7
MW210	11/23/2021	28.1	7.84	2.58	12272		-10.7
MW210	18/01/2022	28.1	7.84	2.58	12,272		-10.7
MW210	21/06/2022	24.3	8.43	4.92	1,062		43.9

		Field Parameters					
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	TDS (Field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mg/L	mV
Location ID	Date						
MW210	25/11/2022	26.1	8.49	2.67	1912	1235	-136.8
MW210	6/27/2023	25.5	8.17	2.35	30585	19874	-184.2
MW212	3/03/2018	30.2	7.46	0.14	27,470		-149.2
MW212	2/06/2018	28.9	9.19	0.12	26,826		-149
MW212	13/10/2018	28.1	7.51	0	30,183		
MW212	23/08/2019	28	7.31	0.09	34,067		
MW212	28/11/2019	30	7.53	4.45	28,179		25.5
MW212	18/03/2020	31.2	7.03	2.24	32,903		
MW212	26/06/2020	27.9	7.42	1.71	26,845		-109.5
MW212	17/11/2020	30	7.33	1.71	37,518		14.9
MW212	22/06/2021	26.5	7.52	0.87	28,374		53.1
MW212	11/23/2021	27.4	7.49	1.1	27271		131.5
MW212	18/01/2022	27.4	7.49	1.1	27,271		131.5
MW212	21/06/2022	26.3	7.83	2.85	7,000		46.9
MW212	25/11/2022	26.3	8.34	2.67	1858	1208	-138.4
MW212	6/27/2023	25.6	7.75	0.69	3134	2028	-26.6
MW213	23/02/2018	29.5	7.14	0.6	5,220		-77.2
MW213	16/06/2018	29.2	7.3	0.23	6,257		-127
MW213	6/10/2018	28.2	7.89	0.99	4,130		
MW213	29/08/2019	26.2	7.63	1	5,115		
MW213	28/11/2019	28	7.82	3.81	4,292		-48
MW213	25/06/2020	28.2	7.62	2.56	6,261		-185.8
MW213	18/11/2020	27.3	8.12	3.19	9,389		38.3
MW213	23/06/2021	23.6	7.35	2.1	5,367		-51.3
MW213	11/23/2021	26.7	7.49	1.65	3647		79.5
MW213	18/01/2022	26.7	7.49	1.65	3,647		79.5
MW213	21/06/2022	25.7	7.56	1.32	4,377		39.6
MW213	23/11/2022	27.7	8.02	1.6	2849	1850	-125.4
MW213	6/27/2023	25.2	8.08	1	11458	7449	8.1
MW214	27/02/2018	30.1	7.69	0.68	2,749		
MW214	16/06/2018	29.3	7.69	0.26	4,795		
MW214	9/10/2018	28	7.68	0.3	4,192		
MW214	29/08/2019	28.1	7.38	0.52	4,088		
MW214	28/11/2019	27.9	8.02	2.97	4,584		-48
MW214	22/06/2021	25.2	8.25	3.9	5,867		103.1
MW214	11/23/2021	27.1	7.9	1.56	3160		90.4
MW214	18/01/2022	27.1	7.9	1.56	3,160		90.4
MW214	21/06/2022	26	8.18	3.73	855		-2.6
MW214	23/11/2022	29	8.42	1.85	1124	731	-88.4
MW214	6/27/2023	24.3	8.2	3.57	1305	848	8
MW217	2/03/2018	27	7.45	3.92	70,327		-3.5
MW217	18/06/2018	28.7	7.57	3.03	47,418		65.6
MW217	28/11/2019	27.8	7.4	7.8	1,104		28.7
MW217	26/06/2020	27.6	7.45	2.15	39,145		47.6
MW217	18/11/2020	25.5	7.67	2.3	37,920		127.2
MW217	22/06/2021	24.4	7.62	3.58	43,182		136.8
MW217	11/23/2021	26	7.3	1.94	39274		133.6
MW217	18/01/2022	26	7.3	1.94	39,274		133.6
MW217	21/06/2022	26.6	7.83	1.47	15,675		-157.8
MW218	2/03/2018	26	7.63	0.18	25,438		-9.7
MW218	18/06/2018	27.8	7.66	1.46	22,768		53.1
MW218	28/11/2019	37.6	7.72	7.46	1,103		155
MW218	26/06/2020	27.4	7.65	3.49	23,708		14.4
MW218	17/11/2020	27.4	7.39	3.53	29,933		-24
MW218	22/06/2021	25.6	7.86	4.39	10,748		119.4
MW218	11/23/2021	26.7	7.66	3.74	19129		124.4
MW218	18/01/2022	26.7	7.66	3.74	19,129		124.4
MW218	21/06/2022	26.5	8.22	2.06	5,876		-157.6
MW218	24/11/2022	25.5	8.29	4.31	4774	3106	
MW218	6/27/2023	24.6	7.85	4.63	6832	4443	2.9
OTH002	27/06/2020	24.5	8.19	4.82	54,000		54
OTH002	17/11/2020	28.6	8.13	4.17	55,836		82.4
OTH002	22/06/2021	21.4	7.87	4.63	54,620		47.2
OTH002	11/23/2021	25.7	8.11	4.38	54923		18.8
OTH101	20/06/2018	21.5	8.3	5.62	49,259		
OTH101	28/11/2019	29.4	7.88	5.24	23,998		-53.9
OTH101	27/06/2020	24.4	8.18	4.94	53,222		52.6
OTH101	18/11/2020	29.1	8.15	4.67	63,065		2.7
OTH101	22/06/2021	21.6	8.1	5.05	29,512		-62.9
OTH101	11/24/2021	24.2	8.17	5.56	54645		18
OTH101	21/06/2022	24.4	8.17	5.37	54,108		-181.7
OTH101	24/11/2022	27.9	8.29	5.41	54249	35262	-125.4
OTH101	6/27/2023	19.5	8.19	5.75	55067	35792	-75.6
OTH102	20/06/2018	21.1	8.36	5.29	48,596		
OTH102	28/11/2019	28.8	8.08	5.46	23,737		-48.8
OTH102	28/06/2020	24.5	8.23	5	53,630		52.9
OTH102	18/11/2020	27.5	8.21	4.3	61,330		7.3
OTH102	22/06/2021	22.3	8.08	4.07	54,611		-163.5
OTH102	11/23/2021	26.8	8.25	4.68	54368		91.6
OTH102	21/06/2022	24.6	8.19	4.71	54,071		-173.7
OTH102	25/11/2022	26.1	8.21	4.55	53199	34585	-105.4
OTH102	6/27/2023	19.4	8.15	6.02	55193	35880	-74.4
OTH103	27/06/2020	23.9	8.2	5.27	53,807		54
OTH103	17/11/2020	28.4	8.21	4.84	29,130		94.2
OTH103	22/06/2021	19.4	7.97	5.37	54,942		60.7
OTH103	11/23/2021	26.9	8.11	3.55	55057		35.2
OTH103	21/06/2022	23.2	8.06	4.6	54,674		50.1
OTH103	25/11/2022	24.6	8.16	3.36	53424	34723	-60.9
OTH103	6/27/2023	19.1	8.15	5.4	53889	35035	24.1
OTH104	9/06/2018	22.5	8.32	5.88	53,000		
OTH104	28/11/2019	29.4	8.05	3.77	59,053		-395.8
OTH104	27/06/2020	24.7	8.18	5.11	54,104		56.1
OTH104	18/11/2020	26.3	7.88	1.49	60,892		93.1
OTH104	22/06/2021	21.6	8.05	4.85	55,187		117.1
OTH104	11/23/2021	26.1	8.07	4.82	54374		36.6
OTH104	21/06/2022	23.4	7.99	4.51	54,977		49.9
OTH104	24/11/2022	26.2	8.18	4.4	53857	35013	-98.1
OTH104	6/27/2023	18.9	8.16	4.93	53722	34924.5	23.3
OTH105	9/06/2018	22.7	8.32	4.16	50,815		
OTH105	28/11/2019	30.6	7.94	6.15	60,226		-47.8
OTH105	27/06/2020	24.2	8.19	12.38	53,852		55.3
OTH105	17/11/2020	28.6	8.18	5.34	54,876		167.6
OTH105	22/06/2021	22.1	8.05	4.72	55,423		127.2
OTH105	11/23/2021	25.9	8.04	5.58	55072		2.5
OTH105	21/06/2022	21.8	8	5.44	54,057		-57.6
OTH105	24/11/2022	27.8	8.16	4.29	54438	35397	-90.4
OTH105	6/27/2023	17.4	8.09	6.73	28264	18371	-69.1
OTH106	9/06/2018	22.7	8.32	4.33	51,155		
OTH106	28/11/2019	32.9	7.96	3.15	62,938		-337.1
OTH106	27/06/2020	24.6	8.1	4.97	54,272		54.7
OTH106	17/11/2020	28	8.19	4.27	8.19		170.4
OTH106	22/06/2021	19.3	8.09	5.78	28,920		133.1
OTH106	11/23/2021	26.8	8.05	5.54	55104		-3

		Field Parameters					
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	TDS (Field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mg/L	mV
Location ID	Date						
OTH106	21/06/2022	21.5	8.08	5.02	53,934		-56.2
OTH106	24/11/2022	26.4	8.17	4.18	54824	35646	-100.2
OTH106	6/27/2023	15.9	8.36	6.36	53292	34640	-70.3
OTH107	23/06/2018	20.1	8.33	4.91	47,999		
OTH107	28/11/2019	32.2	7.05	2.77	61,951		-364.2
OTH107	27/06/2020	24.1	8.13	6.6	54,195		51.9
OTH107	17/11/2020	28.4	8.18	4.28	55,681		186.7
OTH107	22/06/2021	18.4	8.05	6.13	55,382		132.6
OTH107	11/23/2021	26.1	8.03	5.76	55084		-2.2
OTH107	21/06/2022	21.3	7.99	4.4	54,230		-68.1
OTH107	23/11/2022	29.9		2.88	54184	35230	86.8
OTH107	6/27/2023	14.9	8.08	6.85	55496	36072	-60.3
OTH108	28/11/2019	33.8	6.43	3.9	64,330		86
OTH108	17/11/2020	30.4	8.13	3.66	55,493		190.3
OTH108	22/06/2021	17.4	7.99	6.04	36,420		136.3
OTH108	11/23/2021	24.5	8.03	5.55	54390		51
OTH108	21/06/2022	21.3	7.78	4.93	52,813		-70.7
OTH108	23/11/2022	30.6	8.69	3.07	53689	34970	29.9
OTH108	6/27/2023	15.7	8.08	6.47	54917	35695	-71.7
OTH109	20/06/2018	21.1	8.37	5.65	48,894		
OTH109	28/11/2019	27.9	8.03	4.79	58,036		12.5
OTH109	26/06/2020	27.3	8.09	4.01	53,044		-154.1
OTH109	18/11/2020	28.5	8.22	3.73	62,615		-15.9
OTH109	22/06/2021	24.1	7.99	4.22	51,999		116.7
OTH109	11/24/2021	24.2	8.18	5.55	54800		-4.6
OTH109	21/06/2022	24.3	8.22	4.98	53,602		-155.4
OTH109	24/11/2022	27.2	8.28	5.59	53358	34687	-100.5
OTH109	6/27/2023	18.1	8.15	5.16	54748	35590	-72.6
OTH110	20/06/2018	21.1	8.34	4.52	48,751		
OTH110	28/11/2019	31.1	8.04	2.76	61,428		17.3
OTH110	26/06/2020	27.6	8.11	3.68	53,620		-110.5
OTH110	18/11/2020	28.4	8.21	1.1	61,587		7.1
OTH110	22/06/2021	22.9	8	4.58	54,161		88.5
OTH110	11/24/2021	24.4	8.15	5.49	54795		-3.5
OTH110	21/06/2022	25.1	8.14	5.49	53,846		-148.1
OTH110	24/11/2022	28.1	8.24	5.84	53921	35046	-108.4
OTH110	6/27/2023	19.4	8.17	6.75	31582	20552	-71.3
OTH113	10/06/2018	22.4	8.08	4.67	50,028		
OTH113	28/11/2019	27.6	8.42	4.49	57,149		35.8
OTH113	28/06/2020	24.7	8.17	4.69	52,667		59.1
OTH113	17/11/2020	26.6	7.86	4.35	55,753		50
OTH113	22/06/2021	20.8	8.1	3.99	54,859		94.9
OTH113	11/23/2021	26.3	8.29	4.37	54459		61
OTH113	21/06/2022	25.3	8.17	4.75	53,566		8.9
OTH113	23/11/2022	31.1	8.38	4.3	53369	34690	-94.8
OTH113	6/27/2023	18.7	8.28	4.5	53149	34554	25.5

		Field Parameters					
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	TDS (Field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mg/L	mV
Location Code	**Date**						
SW112	**2/28/2018**	35.1	8.46	2.59	142,300		-109.6
SW112	**6/8/2018**	19.3	7.38	4.16	11,535		85.6
SW112	**11/28/2019**	37.4	7.25	0.39	279,596		172.6
SW112	**5/26/2020**	22.9	8.07	3.49	83,592		165.5
SW112	**6/25/2020**	25.9	8.13	2.49	106,531		-119.1
SW112	**11/18/2020**	27.7	7.63	1.26	236,394		97.8
SW112	**3/5/2021**	26.4	7.38	2.11	27,607		142.2
SW112	**6/22/2021**	20.5	8.02	5.83	71,983		118
SW112	**5/16/2022**	21.7	7.9	4.76	16,889		62
SW112	**6/21/2022**	23.7	8.34	6.08	10,276		52
SW113	**3/1/2018**	32.6	7.8	1.92	4,870		-88.6
SW113	**6/4/2018**	24.6	7.12	4.85	1,240		110.9
SW113	**5/26/2020**	24	7.28	1.13	3,879		168.1
SW113	**3/5/2021**	25.1	8.58	3.07	1,120		120.4
SW113	**6/23/2021**	13.5	8.07	7.07	485.9		17.5
SW113	**11/23/2021**	24.4	6.91	0.72	1,507		96.6
SW113	**5/16/2022**	22.4		6.06	1,137		200.9
SW113	**6/21/2022**	20.2	7.77	4.53	663		52
SW113	**6/27/2023**	18.1	7.94	7.86	975	634	3.6
SW120	**6/8/2018**	21.9	7.91	6.26	9,471		118
SW120	**5/27/2020**	25.5	8.16	3.81	81,516		156.1
SW120	**3/3/2021**	27.4	7.7	2.7	18,663		113.4
SW120	**6/22/2021**	18.5	8.21	6.71	26,081		95.2
SW120	**5/16/2022**	23.6	7.69	4.83	18,636		64.3
SW120	**6/21/2022**	24.4	8.06	6.78	23,388		13.4
SW126	**6/8/2018**	24.8	7.81	4.02	7,414		-99.3
SW126	**6/21/2022**	25.7	8.45	7.98	8,192		52.7
SW127	**6/6/2018**	25.5	7.33	3.89	4,760		-11.2
SW127	**5/26/2020**	23.8	8.38	5.4	46,810		147.6
SW127	**3/3/2021**	30.8	8.01	2.98	15,376		82.1
SW127	**6/22/2021**	15.9	8.05	7	21,870		129.4
SW127	**5/16/2022**	22.5		5.64	8,541		243.5
SW127	**6/21/2022**	23.1	8.17	5.5	19,818		51
SW128	**6/4/2018**	28.3	7.47	5	169,602		55.6
SW128	**5/27/2020**	24.2	8.4	3.27	62,435		141.9
SW128	**3/3/2021**	30.3	8.14	4.6	18,145		113.6
SW128	**6/22/2021**	15	8.14	6.79	14,142		119.2
SW128	**11/23/2021**	36.5	7.71	0.17	233,502		92.7
SW128	**5/16/2022**	26.3		5.16	13,511		69.7
SW128	**6/21/2022**	25.4	8.2	5.21	21,935		56.6
SW128	**6/27/2023**	13.5	7.85	1.38	212783	38319	35.1

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
Pol Storage	**MW004**	**23 Nov 2021**	**0083_MW004_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.03	<0.02	0.21	<0.02	<0.1	0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW004	**21 Jun 2022**	**0083_MW004_220621**	**Normal**	**EP2207624**	<0.02	<0.02	0.02	<0.02	0.35	<0.02	<0.1	<0.02	0.02	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW004	**25 Nov 2022**	**0083_MW004_221125**	**Normal**	**EP2215920**	<0.02	<0.02	0.02	<0.02	0.18	<0.02	<0.1	0.04	0.02	0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW004	**27 Jun 2023**	**0083_MW004_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.03	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Pol Storage	**MW008**	**28 Feb 2018**	**0083_MW8_180228**	**Normal**	**207612**	0.012	0.016	0.23	0.022	1.9	<0.002	0.027	0.047	0.13	0.035	0.05	0.005	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.04	0.097	<0.001	<0.01	<0.005
	MW008	**16 Jun 2018**	**0083_MW8_180616**	**Normal**	**212374**	0.082	0.12	2.0	0.15	13	0.034	0.20	0.43	1.0	0.29	0.36	0.050	0.009	<0.002	<0.01	<0.02	<0.05	0.001	0.24	0.26	<0.001	0.07	<0.02
	MW008	**30 Nov 2019**	**0083_MW8_7.5-8.0_19113**	**Normal**	**EP1912681**	0.08	0.10	1.50	0.08	7.42	<0.02	0.6	1.79	2.52	1.40	0.51	0.08	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.31	0.16	<0.05	0.02	<0.05
	MW008	**17 Mar 2020**	**MW08_200317**	**Normal**	**EP2002947**	<0.02	<0.02	0.06	<0.02	0.56	<0.02	<0.1	0.06	0.07	0.03	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW008	**26 Jun 2020**	**0083_MW008_200626**	**Normal**	**EP2006686**	0.07	0.08	1.07	0.04	7.47	<0.02	0.3	0.92	1.18	0.59	0.27	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.30	0.25	<0.05	0.04	<0.05
	MW008	**26 Jun 2020**	**0083_QC101_200626**	**Field Duplicate**	**EP2006686**	0.06	0.07	1.00	0.05	7.28	<0.02	0.3	0.89	1.13	0.56	0.26	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.31	0.24	<0.05	0.04	<0.05
	MW008	**26 Jun 2020**	**0083_QC201_200626**	**Interlab Duplicate**	**729409**	0.05	0.07	0.75	0.04	6.3	<0.01	0.26	0.62	0.79	0.38	0.18	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.24	0.12	<0.01	<0.05	<0.05
	MW008	**17 Nov 2020**	**0083_MW008_201117**	**Normal**	**EP2012749**	<0.02	<0.02	<0.02	<0.02	0.40	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW008	**22 Jun 2021**	**0083_MW008_210622**	**Normal**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	0.06	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.08	<0.05	<0.05	<0.02	<0.05
	MW008	**23 Nov 2021**	**0083_MW008_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.01	<0.02	0.37	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW008	**21 Jun 2022**	**0083_MW008_220621**	**Normal**	**EP2207624**	<0.02	<0.02	<0.01	<0.02	0.62	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW008	**21 Jun 2022**	**0083_QC108_220621**	**Field Duplicate**	**EP2207624**	<0.02	<0.02	0.01	<0.02	0.62	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW008	**21 Jun 2022**	**0083_QC208_220621**	**Interlab Duplicate**	**901207**	<0.002	<0.002	0.019	0.003	0.43	<0.004	<0.008	0.006	0.007	<0.004	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	0.017	<0.004	<0.004	<0.004
	MW008	**25 Nov 2022**	**0083_MW008_221125**	**Normal**	**EP2215920**	<0.02	<0.02	0.03	<0.02	0.30	<0.02	<0.1	<0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse	**MW017**	**28 Feb 2018**	**0083_MW17_180228**	**Normal**	**207612**	0.27	0.34	5.8	0.82	7.8	<0.01	2.5	7.2	8.1	2.6	2.1	0.08	<0.01	<0.01	<0.02	<0.05	<0.2	0.059	21	0.34	<0.005	<0.05	<0.02
	MW017	**16 Jun 2018**	**0083_MW17_180616**	**Normal**	**212374**	0.24	0.27	5.8	0.77	12	<0.002	1.9	8.0	8.8	2.5	1.6	0.068	<0.002	<0.002	<0.005	<0.01	<0.05	0.048	24	0.30	<0.001	<0.02	<0.01
	MW017	**28 Nov 2019**	**0083_MW17_191128**	**Normal**	**EP1912603**	0.17	0.19	2.96	0.52	14.2	<0.02	0.6	3.66	3.42	1.14	0.92	0.11	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	12.2	0.82	<0.05	<0.02	<0.05
	MW017	**25 Jun 2020**	**0083_MW017_200625**	**Normal**	**EP2006683**	0.08	0.07	1.40	0.19	10.1	<0.02	1.0	3.34	3.42	1.32	0.78	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	7.12	0.49	<0.05	<0.02	<0.05
	MW017	**25 Jun 2020**	**0083_QC103_200625**	**Field Duplicate**	**EP2006683**	0.08	0.08	1.47	0.20	10.4	<0.02	1.0	3.36	3.22	1.26	0.77	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	7.16	0.48	<0.05	<0.02	<0.05
	MW017	**25 Jun 2020**	**0083_QC203_200625**	**Interlab Duplicate**	**729352**	0.06	0.13	1.5	0.22	9.0	<0.01	0.92	2.6	2.8	1.1	0.59	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.05	0.33	<0.01	<0.05	<0.05
	MW017	**18 Nov 2020**	**0083_MW017_201118**	**Normal**	**EP2012802**	0.05	0.06	1.59	0.18	15.4	<0.02	1.0	3.89	3.35	1.34	0.80	0.08	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.38	0.30	<0.05	<0.02	<0.05
	MW017	**22 Jun 2021**	**0083_MW017_210622**	**Normal**	**EP2107095**	0.04	0.05	0.98	0.17	9.72	<0.02	0.6	2.20	2.08	0.84	0.54	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	5.06	0.81	<0.05	<0.02	<0.05
	MW017	**23 Nov 2021**	**0083_MW017_211123**	**Normal**	**EP2114300**	0.06	0.04	0.96	0.15	14.2	<0.02	0.6	1.93	2.38	0.77	0.50	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	5.20	0.88	<0.05	<0.02	<0.05
	MW017	**21 Jun 2022**	**0083_MW017_220621**	**Normal**	**EP2207630**	0.13	0.13	2.59	0.15	9.45	<0.02	2.4	8.70	9.62	4.68	0.90	0.07	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.11	0.55	<0.05	<0.02	<0.05
	MW017	**21 Jun 2022**	**0083_QC113_220621**	**Field Duplicate**	**EP2207630**	0.15	0.16	3.25	0.13	6.50	<0.02	3.0	10.7	11.5	5.27	1.08	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.84	0.36	<0.05	<0.02	<0.05
	MW017	**21 Jun 2022**	**0083_QC213_220621**	**Interlab Duplicate**	**901207**	0.12	0.18	0.32	0.15	0.48	<0.004	0.017	1.1	1.4	0.62	0.16	0.069	0.001	<0.001	<0.001	<0.001	<0.001	<0.008	0.13	0.006	<0.004	<0.004	<0.004
	MW017	**24 Nov 2022**	**0083_MW017_221124**	**Normal**	**EP2215848**	0.03	0.05	1.15	0.11	12.3	<0.02	0.8	2.41	2.35	1.21	0.48	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	4.01	0.90	<0.05	<0.02	<0.05
	MW017	**24 Nov 2022**	**0083_QC128_221124**	**Field Duplicate**	**EP2215848**	0.05	0.04	1.10	0.11	10.8	<0.02	0.9	2.56	2.58	1.40	0.51	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.60	0.81	<0.05	<0.02	<0.05
	MW017	**24 Nov 2022**	**0083_QC228_221124**	**Interlab Duplicate**	**945147**	0.03	0.05	1.1	0.13	15	<0.01	0.80	2.4	2.4	1.2	0.42	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	3.0	0.65	<0.01	<0.05	<0.05
	MW017	**27 Jun 2023**	**0083_MW017_230627**	**Normal**	**EP2308621**	0.05	0.05	1.20	0.11	13.9	<0.02	1.1	3.24	3.34	2.10	0.68	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.36	0.28	<0.05	<0.02	<0.05
	MW017	**27 Jun 2023**	**0083_QC114_230627**	**Field Duplicate**	**EP2308621**	0.08	0.11	4.46	0.06	5.05	<0.02	4.6	9.92	11.5	8.23	2.35	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	4.63	0.49	<0.05	<0.02	<0.05
	MW017	**27 Jun 2023**	**0083_QC214_230627**	**Interlab Duplicate**	**1004390**	0.06	0.16	4.1	0.08	4.9	<0.01	3.9	12	14	8.6	2.2	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.4	0.32	<0.01	<0.05	<0.05
Powerhouse	**MW019**	**23 Feb 2018**	**0083_MW19_180223**	**Normal**	**207359**	0.022	0.012	0.10	<0.001	0.016	<0.002	0.072	<0.002	0.046	0.040	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW019	**16 Jun 2018**	**0083_MW19_180616**	**Normal**	**212374**	0.014	0.013	0.077	<0.001	0.016	<0.002	<0.02	0.027	0.028	<0.01	<0.01	<0.01	<0.02	<0.04	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.1
	MW019	**17 Mar 2020**	**MW19_200317**	**Normal**	**EP2002947**	<0.02	<0.02	0.06	<0.02	<0.01	<0.02	<0.1	0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**25 Jun 2020**	**0083_MW019_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.07	<0.02	0.03	<0.02	<0.1	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**18 Nov 2020**	**0083_MW019_201118**	**Normal**	**EP2012802**	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**23 Jun 2021**	**0083_MW019_210623**	**Normal**	**EP2107188**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**23 Nov 2021**	**0083_MW019_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.05	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**21 Jun 2022**	**0083_MW019_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.09	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**23 Nov 2022**	**0083_MW019_221123**	**Normal**	**EP2215793**	<0.02	<0.02	0.07	<0.02	0.02	<0.02	<0.1	0.03	<0.02	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**27 Jun 2023**	**0083_MW019_230627**	**Normal**	**EP2308621**	<0.02	<0.02	0.05	<0.02	0.01	<0.02	<0.3	0.06	0.04	0.05	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**27 Jun 2023**	**0083_QC113_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.02	0.05	<0.02	0.01	<0.02	<0.2	0.04	0.04	0.04	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW019	**27 Jun 2023**	**0083_QC213_230627**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	0.04	<0.01	0.01	<0.01	<0.05	0.04	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
Powerhouse	**MW027**	**23 Feb 2018**	**0083_MW27_180223**	**Normal**	**207359**	0.022	0.020	0.39	0.008	0.14	<0.002	0.10	0.23	0.30	0.15	0.031	0.003	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW027	**16 Jun 2018**	**0083_MW27_180616**	**Normal**	**212374**	0.018	0.019	0.20	0.003	0.088	<0.002	0.046	0.12	0.089	0.059	0.012	0.003	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	0.002	<0.001	<0.001	<0.1	<0.02
	MW027	**28 Nov 2019**	**0083_MW27_191128**	**Normal**	**EP1912603**	0.03	<0.02	0.30	<0.02	0.09	<0.02	<0.1	0.15	0.12	0.07	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**28 Nov 2019**	**0083_QC101_191128**	**Field Duplicate**	**EP1912603**	<0.02	<0.02	0.33	<0.02	0.10	<0.02	0.2	0.22	0.14	0.06	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**28 Nov 2019**	**0083_QC201_191128**	**Interlab Duplicate**	**691456**	0.14	0.02	0.22	<0.01	0.09	<0.01	0.05	0.11	0.12	0.06	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW027	**25 Jun 2020**	**0083_MW027_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.23	<0.02	0.10	<0.02	<0.1	0.12	0.06	0.05	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**18 Nov 2020**	**0083_MW027_201118**	**Normal**	**EP2012802**	<0.02	<0.02	0.24	<0.02	0.09	<0.02	<0.1	0.04	0.08	0.04	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**23 Jun 2021**	**0083_MW027_210623**	**Normal**	**EP2107188**	<0.02	<0.02	0.17	<0.02	0.10	<0.02	<0.1	<0.02	0.03	0.04	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**23 Nov 2021**	**0083_MW027_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.44	<0.02	0.12	<0.02	<0.1	0.19	0.21	0.12	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**21 Jun 2022**	**0083_MW027_220621**	**Normal**	**EP2207630**	<0.02	0.02	0.66	<0.02	0.94	<0.02	<0.1	0.17	0.18	0.13	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**23 Nov 2022**	**0083_MW027_221123**	**Normal**	**EP2215793**	<0.02	<0.02	0.12	<0.02	0.08	<0.02	<0.1	0.03	0.03	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**23 Nov 2022**	**0083_QC124_221123**	**Field Duplicate**	**EP2215793**	<0.02	<0.02	0.15	<0.02	0.08	<0.02	<0.1	0.05	0.04	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**23 Nov 2022**	**0083_QC224_221123**	**Interlab Duplicate**	**945147**	0.03	<0.01	0.11	<0.01	0.06	<0.01	<0.05	0.04	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW027	**27 Jun 2023**	**0083_MW027_230627**	**Normal**	**EP2308621**	0.08	0.08	1.62	0.03	0.41	<0.02	0.2	0.64	0.61	0.27	0.10	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**27 Jun 2023**	**0083_QC111_230627**	**Field Duplicate**	**EP2308621**	0.03	0.02	0.63	<0.02	0.21	<0.02	<0.2	0.20	0.21	0.11	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW027	**27 Jun 2023**	**0083_QC211_230627**	**Interlab Duplicate**	**1004390**	0.05	0.02	0.55	<0.01	0.18	<0.01	0.10	0.21	0.22	0.10	0.05	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
Powerhouse	**MW101**	**28 Feb 2018**	**0083_MW101_180228**	**Normal**	**207612**	0.013	<0.005	0.45	<0.005	0.041	<0.01	0.67	0.21	0.29	0.22	0.11	<0.005	<0.01	<0.01	<0.02	<0.05	<0.2	<0.005	0.052	<0.005	<0.005	<0.5	<0.2
	MW101	**28 Feb 2018**	**0083_QC2301_180228**	**Interlab Duplicate**	**588076**	0.02	0.04	0.37	<0.01	0.07	<0.01	0.15	0.31	0.22	0.11	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW101	**16 Jun 2018**	**0083_MW101_180616**	**Normal**	**212374**	0.022	0.016	0.49	<0.002	0.047	<0.004	0.25	0.40	0.32	0.17	0.047	<0.02	<0.02	<0.04	<0.04	<0.1	<0.2	<0.2	<0.001	0.042	<0.001	<0.001	<0.2	<0.1
	MW101	**25 Jun 2020**	**0083_MW101_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.17	<0.02	<0.01	<0.02	1.0	0.37	<0.02	0.12	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**25 Jun 2020**	**0083_QC102_200625**	**Field Duplicate**	**EP2006683**	<0.02	<0.02	0.20	<0.02	<0.01	<0.02	1.1	0.28	<0.02	0.15	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**25 Jun 2020**	**0083_QC202_200625**	**Interlab Duplicate**	**729352**	0.02	<0.01	0.18	<0.01	0.03	<0.01	0.11	0.30	0.19	0.10	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW101	**18 Nov 2020**	**0083_MW101_201118**	**Normal**	**EP2012802**	<0.02	<0.02	0.25	<0.02	<0.01	<0.02	<0.1	<0.02	0.22	0.10	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**23 Jun 2021**	**0083_MW101_210623**	**Normal**	**EP2107188**	0.02	<0.02	0.31	<0.02	<0.01	<0.02	<0.1	<0.02	0.29	0.23	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**23 Nov 2021**	**0083_MW101_211123**	**Normal**	**EP2114295**	<0.02	<0.02	0.28	<0.02	<0.01	<0.02	<0.1	<0.02	0.20	0.14	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**21 Jun 2022**	**0083_MW101_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.20	<0.02	0.11	<0.02	<0.1	0.17	0.18	0.12	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**24 Nov 2022**	**0083_MW101_221124**	**Normal**	**EP2215848**	<0.02	<0.02	0.28	<0.02	0.03	<0.02	<0.1	<0.02	0.14	0.10	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW101	**27 Jun 2023**	**0083_MW101_230627**	**Normal**	**EP2308621**	<0.03	<0.02	0.17	<0.02	<0.01	<0.02	<0.2	0.08	0.10	0.07	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse	**MW102**	**28 Feb 2018**	**0083_MW102_180228**	**Normal**	**207612**	0.055	0.049	0.66	<0.005	0.084	<0.01	0.54	1.3	0.85	0.55	0.12	0.013	<0.01	<0.01	<0.02	<0.05	<0.2	<0.005	0.016	<0.005	<0.005	<0.05	<0.02
	MW102	**16 Jun 2018**	**0083_MW102_180616**	**Normal**	**212374**	0.037	0.031	0.50	0.006	0.040	<0.002	0.55	1.3	0.93	0.63	0.13	0.021	<0.02	<0.02	<0.02	<0.02	<0.05	<0.001	0.014	<0.001	<0.001	<0.1	<0.1
	MW102	**25 Jun 2020**	**0083_MW102_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.17	<0.02	0.05	<0.02	<0.1	0.23	<0.02	0.10	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW102	**18 Nov 2020**	**0083_MW102_201118**	**Normal**	**EP2012802**	<0.02	0.03	0.39	<0.02	0.06	<0.02	<0.1	0.32	0.45	0.27	0.06	<0.02

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
Powerhouse	**MW103**	**28 Feb 2018**	**0083_MW103_180228**	**Normal**	**207612**	0.27	0.23	1.2	<0.005	0.11	<0.01	0.97	2.7	2.6	0.56	0.084	0.006	<0.01	<0.01	<0.02	<0.05	<0.2	<0.005	0.039	<0.005	<0.005	<0.05	<0.02
	MW103	**16 Jun 2018**	**0083_MW103_180616**	**Normal**	**212374**	0.15	0.22	0.93	0.012	0.078	<0.002	0.76	1.9	2.1	0.37	0.051	0.003	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	0.037	<0.001	<0.001	<0.02	<0.01
	MW103	**16 Jun 2018**	**0083_QC149_180616**	**Field Duplicate**	**212374**	0.17	0.20	0.93	0.014	0.091	<0.002	0.83	2.2	1.9	0.42	0.050	0.003	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.029	<0.001	<0.001	<0.02	<0.01
	MW103	**16 Jun 2018**	**0083_QC249_180616**	**Interlab Duplicate**	**604955**	0.22	0.17	1.1	<0.01	0.14	<0.01	0.62	2.2	1.8	0.35	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW103	**28 Nov 2019**	**0083_MW103_191128**	**Normal**	**EP1912603**	0.20	0.24	1.17	0.02	0.06	<0.02	0.8	2.55	2.08	0.36	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**28 Nov 2019**	**0083_QC102_191128**	**Field Duplicate**	**EP1912603**	0.24	0.19	1.04	<0.02	0.08	<0.02	0.9	2.54	2.13	0.38	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**28 Nov 2019**	**0083_QC202_191128**	**Interlab Duplicate**	**691456**	0.21	0.21	0.91	<0.01	0.07	<0.01	0.74	2.1	2.0	0.39	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW103	**25 Jun 2020**	**0083_MW103_200625**	**Normal**	**EP2006683**	0.12	0.11	0.60	<0.02	0.08	<0.02	0.4	1.12	1.02	0.21	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**18 Nov 2020**	**0083_MW103_201118**	**Normal**	**EP2012802**	0.10	0.07	0.45	<0.02	0.06	<0.02	0.3	0.94	0.84	0.18	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**22 Jun 2021**	**0083_MW103_210622**	**Normal**	**EP2107184**	0.09	0.08	0.50	<0.02	0.09	<0.02	0.4	1.48	1.21	0.27	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.11	<0.05	<0.05	<0.02	<0.05
	MW103	**22 Jun 2021**	**0083_QC106_210622**	**Field Duplicate**	**EP2107184**	0.09	0.08	0.52	<0.02	0.09	<0.02	0.5	1.55	1.29	0.28	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.11	<0.05	<0.05	<0.02	<0.05
	MW103	**22 Jun 2021**	**0083_QC206_210622**	**Interlab Duplicate**	**805492**	0.09	0.08	0.51	<0.01	0.08	<0.01	0.50	1.3	1.1	0.23	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	<0.05	<0.05
	MW103	**23 Nov 2021**	**0083_MW103_211123**	**Normal**	**EP2114295**	0.12	0.10	0.59	<0.02	0.05	<0.02	0.3	1.31	1.19	0.28	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**21 Jun 2022**	**0083_MW103_220621**	**Normal**	**EP2207630**	0.06	0.05	0.36	<0.02	0.05	<0.02	0.2	0.62	0.57	0.12	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**24 Nov 2022**	**0083_MW103_221124**	**Normal**	**EP2215848**	0.05	0.07	0.53	<0.02	0.07	<0.02	0.3	0.96	0.72	0.19	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW103	**27 Jun 2023**	**0083_MW103_230627**	**Normal**	**EP2308621**	0.10	0.10	0.71	<0.02	0.07	<0.02	0.4	1.10	1.02	0.33	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse	**MW104**	**28 Feb 2018**	**0083_MW104_5.5-6.0_180**	**Normal**	**207612**	0.003	0.002	0.003	<0.001	0.002	<0.002	0.01	<0.002	0.005	0.001	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005
	MW104	**28 Feb 2018**	**0083_MW104_7.5-8.0_180**	**Normal**	**207612**	0.007	0.003	<0.001	<0.001	0.002	<0.002	0.007	<0.002	0.002	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW104	**28 Feb 2018**	**0083_MW104_9.5-10.0_18**	**Normal**	**207612**	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW104	**18 Jun 2018**	**0083_MW104_3.5-4.0_180**	**Normal**	**212374**	0.001	<0.001	0.003	<0.001	0.001	<0.002	0.005	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW104	**18 Jun 2018**	**0083_MW104_5.5-6.0_180**	**Normal**	**212374**	0.002	0.002	0.002	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW104	**18 Jun 2018**	**0083_MW104_7.5-8.0_180**	**Normal**	**212374**	0.005	0.002	<0.001	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW104	**18 Jun 2018**	**0083_MW104_9.5-10.0_18**	**Normal**	**212374**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	0.004	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW104	**28 Nov 2019**	**0083_MW104_5.5-6.0_191**	**Normal**	**EP1912603**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**25 Jun 2020**	**0083_MW104_200625**	**Normal**	**EP2006683**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**18 Nov 2020**	**0083_MW104_201118**	**Normal**	**EP2012904**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**22 Jun 2021**	**0083_MW104_210622**	**Normal**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**22 Jun 2021**	**0083_QC107_210622**	**Field Duplicate**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**22 Jun 2021**	**0083_QC207_210622**	**Interlab Duplicate**	**805492**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW104	**23 Nov 2021**	**0083_MW104_5.5-6_2111**	**Normal**	**EP2114300**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**23 Nov 2021**	**0083_QC214_211123**	**Interlab Duplicate**	**844500**	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW104	**21 Jun 2022**	**0083_MW104_220621**	**Normal**	**EP2207630**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**24 Nov 2022**	**0083_MW104_5.5-6.0_221**	**Normal**	**EP2215848**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW104	**27 Jun 2023**	**0083_MW104_5.5-6.0_230**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Pol Storage	**MW105**	**03 Mar 2018**	**0083_MW105_2.0-2.5_180**	**Normal**	**207818**	0.014	0.026	0.51	0.07	0.68	<0.002	0.22	0.37	0.68	0.28	0.29	0.028	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.086	<0.001	<0.001	<0.01	<0.005
	MW105	**03 Mar 2018**	**0083_MW105_4.0-4.5_180**	**Normal**	**207818**	0.009	0.009	0.069	0.01	0.15	<0.002	0.052	0.067	0.15	0.023	0.021	0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.14	<0.001	<0.001	<0.01	<0.005
	MW105	**03 Mar 2018**	**0083_MW105_6.0-6.5_180**	**Normal**	**207818**	0.027	0.033	0.15	0.006	0.067	<0.002	0.04	0.037	0.16	0.03	0.02	0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.064	<0.001	<0.001	<0.01	<0.005
	MW105	**03 Mar 2018**	**0083_MW105_8.0-8.5_180**	**Normal**	**207818**	0.021	0.017	0.037	0.001	0.008	<0.002	0.006	0.01	0.039	0.005	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.008	<0.001	<0.001	<0.01	<0.005
	MW105	**02 Jun 2018**	**0083_MW105-4.0-4.5_180**	**Normal**	**211639**	0.003	0.004	0.040	0.007	0.20	<0.002	0.030	0.044	0.096	0.012	0.007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.072	0.001	<0.001	<0.01	<0.005
	MW105	**02 Jun 2018**	**0083_MW105-6.0-6.5_180**	**Normal**	**211639**	0.022	0.019	0.069	0.007	0.040	<0.002	0.01	0.01	0.057	0.007	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.008	<0.001	<0.001	<0.01	<0.005
	MW105	**02 Jun 2018**	**0083_MW105-8.0-8.5_180**	**Normal**	**211639**	0.017	0.012	0.031	<0.001	0.007	<0.002	0.004	0.009	0.028	0.003	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.003	<0.001	<0.001	<0.01	<0.005
	MW105	**28 Nov 2019**	**0083_MW105_4.0-4.5_191**	**Normal**	**EP1912600**	<0.02	<0.02	0.16	<0.02	0.24	<0.02	<0.1	0.20	0.27	0.07	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.33	<0.05	<0.05	<0.02	<0.05
	MW105	**26 Jun 2020**	**0083_MW105_200626**	**Normal**	**EP2006686**	<0.02	<0.02	0.02	<0.02	0.12	<0.02	<0.1	0.08	0.07	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.13	<0.05	<0.05	<0.02	<0.05
	MW105	**17 Nov 2020**	**0083_MW105_201117**	**Normal**	**EP2012749**	<0.02	<0.02	0.09	<0.02	0.22	<0.02	<0.1	0.12	0.17	0.06	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.58	<0.05	<0.05	<0.02	<0.05
	MW105	**17 Nov 2020**	**0083_QC106_201117**	**Field Duplicate**	**EP2012749**	0.02	<0.02	0.12	<0.02	0.20	<0.02	<0.1	0.20	0.26	0.11	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.55	<0.05	<0.05	<0.02	<0.05
	MW105	**17 Nov 2020**	**0083_QC206_201117**	**Interlab Duplicate**	**758001**	0.02	0.01	0.20	<0.01	0.24	<0.01	0.11	0.23	0.23	0.12	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.60	<0.01	<0.01	<0.05	<0.05
	MW105	**22 Jun 2021**	**0083_MW105_210622**	**Normal**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW105	**23 Nov 2021**	**0083_MW105_6-6.5_2111**	**Normal**	**EP2114296**	<0.02	<0.02	0.08	<0.02	0.05	<0.02	<0.1	0.04	0.09	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW105	**21 Jun 2022**	**0083_MW105_4-4.5_2206**	**Normal**	**EP2207624**	<0.02	<0.02	0.03	<0.02	0.14	<0.02	<0.1	0.16	0.15	0.04	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW105	**25 Nov 2022**	**0083_MW105_4.0-4.5_221**	**Normal**	**EP2215920**	<0.02	<0.02	0.02	<0.02	0.07	<0.02	<0.1	0.13	0.13	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.10	<0.05	<0.05	<0.02	<0.05
	MW105	**27 Jun 2023**	**0083_MW105_4.0-4.5_230**	**Normal**	**EP2308617**	<0.02	<0.02	0.07	<0.02	0.06	<0.02	<0.1	0.06	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
POL Pathway	**MW107**	**03 Mar 2018**	**0083_MW107_3.1-4.1_180**	**Normal**	**207818**	0.004	0.01	0.18	0.013	0.22	<0.002	0.071	0.022	0.05	0.024	0.016	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW107	**03 Mar 2018**	**0083_MW107_5.5-6.0_180**	**Normal**	**207818**	<0.001	<0.001	<0.001	<0.001	0.013	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW107	**03 Mar 2018**	**0083_MW107_7.5-8.0_180**	**Normal**	**207818**	<0.001	<0.001	0.029	0.014	0.088	<0.002	0.003	0.006	0.008	0.002	0.008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.009	<0.001	<0.001	<0.01	<0.005
	MW107	**17 Jun 2018**	**0083_MW107_5.5-6.0_180**	**Normal**	**212374**	<0.001	<0.001	<0.001	<0.001	0.004	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW107	**17 Jun 2018**	**0083_MW107_7.5-8.0_180**	**Normal**	**212374**	<0.001	0.001	0.027	0.006	0.15	<0.002	0.002	0.002	0.003	<0.001	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.005	<0.001	<0.001	<0.01	<0.01
	MW107	**30 Nov 2019**	**0083_MW107_5.5-6.0_191**	**Normal**	**EP1912681**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**26 Jun 2020**	**0083_MW107_7.5_200626**	**Normal**	**EP2006690**	<0.02	<0.02	0.05	<0.02	0.34	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**17 Nov 2020**	**0083_MW107_201117**	**Normal**	**EP2012742**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**22 Jun 2021**	**0083_MW107_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**23 Nov 2021**	**0083_MW107_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**21 Jun 2022**	**0083_MW107_5.5-6_2206**	**Normal**	**EP2207624**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**25 Nov 2022**	**0083_MW107_3.1-4.1_221**	**Normal**	**EP2215976**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW107	**27 Jun 2023**	**0083_MW107_3.1-4.1_230**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
POL Pathway	**MW109**	**01 Mar 2018**	**0083_MW109_6.5-7.0_180**	**Normal**	**207818**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW109	**01 Mar 2018**	**0083_MW109_9.3-9.8_180**	**Normal**	**207818**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW109	**20 Jun 2018**	**0083_MW109_6.5-7.0_180**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	MW109	**20 Jun 2018**	**0083_MW109_9.3-9.8_180**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	MW109	**30 Nov 2019**	**0083_MW109_6.5-7.0_191**	**Normal**	**EP1912681**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**28 Jun 2020**	**0083_MW109_200628**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**18 Nov 2020**	**0083_MW109_201118**	**Normal**	**EP2012854**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**22 Jun 2021**	**0083_MW109_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**24 Nov 2021**	**0083_MW109_211124**	**Normal**	**EP2114519**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**21 Jun 2022**	**0083_MW109_220621**	**Normal**	**EP2207630**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**25 Nov 2022**	**0083_MW109_6.5-7.0_221**	**Normal**	**EP2215976**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW109	**27 Jun 2023**	**0083_MW109_6.5-7.0_230**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
POL Pathway	**MW110**	**01 Mar 2018**	**0083_MW110_7.5-8.0_180**	**Normal**	**207818**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW110	**01 Mar 2018**	**0083_MW110_9.0-9.5_180**	**Normal**	**207818**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW110	**20 Jun 2018**	**0083_MW110_7.5-8.0_180**	**Normal**	**212571**	<0.001	<0.001	0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
	MW110	25 Nov 2022	0083_MW110_7.5-8.0_221	Normal	EP2215976	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW110	27 Jun 2023	0083_MW110_9.0-9.5_230	Normal	EP2308617	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
POL Pathway	MW111	03 Mar 2018	0083_MW111_8.5-9.0_180	Normal	207818	<0.001	<0.001	0.003	<0.001	0.007	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW111	03 Mar 2018	0083_MW111_10.5-11.0_1	Normal	207818	<0.001	<0.001	0.003	<0.001	0.012	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW111	17 Jun 2018	0083_MW111_8.5-9.0_180	Normal	212374	<0.001	<0.001	0.002	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	MW111	17 Jun 2018	0083_MW111_10.5-11.0_1	Normal	212374	<0.001	<0.001	0.003	<0.001	0.006	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW111	17 Jun 2018	0083_QC155_180617	Field Duplicate	212374	<0.001	<0.001	0.003	<0.001	0.007	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.02
	MW111	17 Jun 2018	0083_QC255_180617	Interlab Duplicate	604955	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW111	28 Nov 2019	0083_MW111_8.5-9.0_191	Normal	EP1912603	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	26 Jun 2020	0083_MW111_10.5_20062	Normal	EP2006690	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	18 Nov 2020	0083_MW111_201118	Normal	EP2012854	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	22 Jun 2021	0083_MW111_210622	Normal	EP2107185	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	23 Nov 2021	0083_MW111_211123	Normal	EP2114295	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	21 Jun 2022	0083_MW111_10.5-11_226	Normal	EP2207624	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	21 Jun 2022	0083_QC114_220621	Field Duplicate	EP2207624	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	21 Jun 2022	0083_QC214_220621	Interlab Duplicate	901207	0.003	<0.002	0.005	<0.002	1.9	<0.004	<0.008	<0.002	0.003	0.005	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004
	MW111	25 Nov 2022	0083_MW111_8.5-9.0_221	Normal	EP2215976	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW111	27 Jun 2023	0083_MW111_8.5-9.0_230	Normal	EP2308617	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
POL Pathway	MW112	03 Mar 2018	0083_MW112_2.0-3.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.005	<0.002	0.009	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW112	03 Mar 2018	0083_MW112_4.5-5.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW112	03 Mar 2018	0083_MW112_6.5-7.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW112	03 Mar 2018	0083_MW112_8.5-9.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.002	<0.01	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW112	17 Jun 2018	0083_MW112_2.0-3.0_180	Normal	212374	<0.001	<0.001	0.002	<0.001	0.007	<0.002	0.01	<0.002	0.002	0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.01
	MW112	17 Jun 2018	0083_MW112_4.5-5.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	MW112	17 Jun 2018	0083_MW112_6.5-7.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	MW112	17 Jun 2018	0083_MW112_8.5-9.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW112	28 Nov 2019	0083_MW112_4.5-5.0_191	Normal	EP1912600	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.05	<0.05	<0.05	<0.02	<0.05
	MW112	26 Jun 2020	0083_MW112_200626	Normal	EP2006686	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.17	<0.05	<0.05	<0.02	<0.05
	MW112	18 Nov 2020	0083_MW112_201118	Normal	EP2012904	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW112	22 Jun 2021	0083_MW112_210622	Normal	EP2107185	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW112	23 Nov 2021	0083_MW112_211123	Normal	EP2114295	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW112	21 Jun 2022	0083_MW112_4.5-5_2206	Normal	EP2207624	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW112	24 Nov 2022	0083_MW112_2.0-3.0_221	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW112	27 Jun 2023	0083_MW112_4.5-5.0_230	Normal	EP2308617	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse Pathway	MW113	01 Mar 2018	0083_MW113_2.5-3.5_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW113	01 Mar 2018	0083_MW113_5.0-5.5_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.1	<0.005
	MW113	01 Mar 2018	0083_MW113_7.0-7.5_180	Normal	207818	<0.001	<0.001	0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW113	17 Jun 2018	0083_MW113_2.5-3.5_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW113	17 Jun 2018	0083_MW113_5.0-5.5_180	Normal	212374	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.01	<0.2	<0.02	<0.02	<0.02	<0.005	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.02
	MW113	17 Jun 2018	0083_MW113_7.0-7.5_180	Normal	212374	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.02
	MW113	28 Nov 2019	0083_MW113_2.5-3.5_191	Normal	EP1912604	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	25 Jun 2020	0083_MW113_200625	Normal	EP2006594	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	18 Nov 2020	0083_MW113_201118	Normal	EP2012854	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	22 Jun 2021	0083_MW113_2.5-3.5_210	Normal	EP2107095	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	23 Nov 2021	0083_MW113_2.5-3.5_211	Normal	EP2114300	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	21 Jun 2022	0083_MW113_2.5-3.5_220	Normal	EP2207626	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	24 Nov 2022	0083_MW113_2.5-3.5_221	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW113	27 Jun 2023	0083_MW113_2.5-3.5_230	Normal	EP2308611	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse Pathway	MW114	01 Mar 2018	0083_MW114_2.0-3.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.01	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005
	MW114	01 Mar 2018	0083_MW114_4.5-5.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW114	01 Mar 2018	0083_MW114_6.5-7.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW114	01 Mar 2018	0083_MW114_8.5-9.0_180	Normal	207818	<0.001	<0.001	0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW114	17 Jun 2018	0083_MW114_2.0-3.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW114	17 Jun 2018	0083_MW114_4.5-5.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW114	17 Jun 2018	0083_MW114_6.5-7.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW114	17 Jun 2018	0083_MW114_8.5-9.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW114	28 Nov 2019	0083_MW114_2.0-3.0_191	Normal	EP1912604	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	25 Jun 2020	0083_MW114_200625	Normal	EP2006594	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	18 Nov 2020	0083_MW114_201118	Normal	EP2012854	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	22 Jun 2021	0083_MW114_2.0-3.0_210	Normal	EP2107095	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	23 Nov 2021	0083_MW114_2.0-3.0_211	Normal	EP2114300	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	21 Jun 2022	0083_MW114_2-3_220621	Normal	EP2207626	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	24 Nov 2022	0083_MW114_4.5-5.0_221	Normal	EP2215871	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	27 Jun 2023	0083_MW114_4.5-5.0_230	Normal	EP2308611	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	27 Jun 2023	0083_QC110_230627	Field Duplicate	EP2308611	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW114	27 Jun 2023	0083_QC210_230627	Interlab Duplicate	1004390	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05
Powerhouse Pathway	MW115	02 Mar 2018	0083_MW115_2.0-3.0_190	Normal	207818	<0.001	<0.001	0.002	<0.001	<0.001	<0.002	0.01	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005
	MW115	02 Mar 2018	0083_MW115_4-5-5.0_190	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW115	02 Mar 2018	0083_MW115_6.5-7.0_190	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW115	02 Mar 2018	0083_MW115_8.5-9.0_190	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW115	17 Jun 2018	0083_MW115_2.0-3.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW115	17 Jun 2018	0083_MW115_4.5-5.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW115	17 Jun 2018	0083_MW115_6.5-7.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW115	17 Jun 2018	0083_MW115_8.5-9.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW115	28 Nov 2019	0083_MW115_2.0-3.0_191	Normal	EP1912604	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW115	28 Nov 2019	0083_QC104_191128	Field Duplicate	EP1912604	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW115	28 Nov 2019	0083_QC204_191128	Interlab Duplicate	691456	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05
	MW115	25 Jun 2020	0083_MW115_200625	Normal	EP2006594	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW115	18 Nov 2020	0083_MW115_201118	Normal	EP2012854	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW115	22 Jun 2021	0083_MW115_8.5-9.0_210	Normal	EP2107095	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
	MW116	03 Mar 2018	0083_MW116_4.5-5.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.004	<0.002	<0.001	0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.01	<0.001	<0.001	<0.01	<0.005
	MW116	03 Mar 2018	0083_MW116_6.5 -7.0_18(	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.01	<0.002	0.002	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005
	MW116	03 Mar 2018	0083_MW116_8.5-9.0_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	0.006	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.007	<0.001	<0.001	<0.01	<0.005
	MW116	17 Jun 2018	0083_MW116_1.2-2.2_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW116	17 Jun 2018	0083_MW116_4.5-5.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW116	17 Jun 2018	0083_MW116_6.5-7.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW116	17 Jun 2018	0083_MW116_8.5-9.0_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW116	28 Nov 2019	0083_MW116_4.5-5.0_191	Normal	EP1912604	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW116	25 Jun 2020	0083_MW116_200625	Normal	EP2006594	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW116	22 Jun 2021	0083_MW116_4.5-5.0_210	Normal	EP2107095	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW116	23 Nov 2021	0083_MW116_4.5-5.0_211	Normal	EP2114300	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW116	21 Jun 2022	0083_MW116_220621	Normal	EP2207626	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW116	23 Nov 2022	0083_MW116_1.2-2.2_221	Normal	EP2215818	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW116	27 Jun 2023	0083_MW116_4.5-5_2306:	Normal	EP2308611	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse Pathway	MW117	03 Mar 2018	0083_MW117_2.0-2.5_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW117	03 Mar 2018	0083_MW117_4.0-4.5_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.01	<0.005
	MW117	03 Mar 2018	0083_MW117_6.0-6.5_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.005	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.019	<0.001	<0.001	<0.01	<0.005
	MW117	03 Mar 2018	0083_MW117_7.4-7.9_180	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005
	MW117	17 Jun 2018	0083_MW117_2.0-2.5_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW117	17 Jun 2018	0083_MW117_4.0-4.5_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW117	17 Jun 2018	0083_MW117_6.0-6.5_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW117	17 Jun 2018	0083_MW117_7.4-7.9_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW117	17 Jun 2018	0083_QC147_180617	Field Duplicate	212374	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW117	17 Jun 2018	0083_QC247_180617	Interlab Duplicate	604955	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05
	MW117	28 Nov 2019	0083_MW117_4.0-4.5_191	Normal	EP1912604	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	23 Jun 2020	0083_MW117_200623	Normal	EP2006520	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	17 Nov 2020	0083_MW117_201117	Normal	EP2012742	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	22 Jun 2021	0083_MW117_6.0-6.5_210	Normal	EP2107095	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	23 Nov 2021	0083_MW117_4-4.5_2111	Normal	EP2114300	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	23 Nov 2021	0083_QC210_211123	Interlab Duplicate	844500	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05
	MW117	21 Jun 2022	0083_MW117_2-2.5_2206:	Normal	EP2207626	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	23 Nov 2022	0083_MW117_2.0-2.5_221	Normal	EP2215818	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW117	27 Jun 2023	0083_MW117_4.0-4.5_230	Normal	EP2308611	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Pol Storage	MW119	01 Mar 2018	0083_MW119_180301	Normal	207818	0.89	1.4	9.6	0.068	0.067	<0.002	0.26	0.68	3.1	0.21	0.13	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW119	01 Mar 2018	0083_QC117_180301	Field Duplicate	207818	0.89	1.4	10	0.072	0.074	<0.002	0.27	0.66	3.1	0.23	0.13	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW119	01 Mar 2018	0083_QC217_180301	Interlab Duplicate	588874	1	1.4	12	0.07	0.12	<0.01	0.29	0.66	3.4	0.19	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW119	17 Jun 2018	0083_MW119_180617	Normal	212374	0.87	1.2	10	0.18	0.091	<0.002	0.30	0.67	2.5	0.21	0.13	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW119	28 Nov 2019	0083_MW119_191128	Normal	EP1912603	0.47	0.60	4.18	0.04	0.06	<0.02	0.4	0.47	1.52	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	25 Jun 2020	0083_MW119_200625	Normal	EP2006683	1.15	1.62	12.4	0.13	0.19	<0.02	0.5	1.40	4.83	0.29	0.22	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	17 Nov 2020	0083_MW119_201117	Normal	EP2012749	0.95	1.82	8.02	0.09	0.10	<0.02	0.4	1.21	3.96	0.24	0.14	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	23 Jun 2021	0083_MW119_210623	Normal	EP2107188	0.94	1.26	7.73	0.07	0.11	<0.02	0.4	1.04	2.99	0.26	0.16	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	23 Nov 2021	0083_MW119_211123	Normal	EP2114296	1.15	1.53	10.8	0.16	0.24	<0.02	0.4	1.48	5.60	0.26	0.21	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	23 Nov 2021	0083_QC113_211123	Field Duplicate	EP2114296	0.78	0.97	7.66	0.10	0.17	<0.02	0.3	0.94	3.88	0.19	0.12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	23 Nov 2021	0083_QC213_211123	Interlab Duplicate	844500	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05
	MW119	21 Jun 2022	0083_MW119_220621	Normal	EP2207630	0.79	1.10	8.39	0.09	0.17	<0.02	0.4	1.12	3.42	0.23	0.15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	24 Nov 2022	0083_MW119_221124	Normal	EP2215848	0.51	0.88	6.38	0.07	0.13	<0.02	0.3	0.87	2.30	0.16	0.13	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW119	27 Jun 2023	0083_MW119_230627	Normal	EP2308617	0.78	1.08	9.14	0.12	0.24	<0.02	0.4	0.97	3.16	0.27	0.20	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Broader Area	MW129	17 Jun 2018	0083_MW129_1.5-2.0_180	Normal	212374	<0.001	<0.001	0.004	<0.001	0.008	<0.002	0.023	<0.01	<0.005	<0.005	0.007	<0.005	<0.004	<0.004	<0.01	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.1	<0.02
	MW129	17 Jun 2018	0083_MW129_5.5-6.0_180	Normal	212374	0.001	<0.001	0.006	<0.001	0.010	<0.002	0.004	0.003	0.009	0.003	0.011	0.002	0.006	<0.004	<0.01	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.02	<0.01
	MW129	17 Jun 2018	0083_MW129_9.5-10.0_18	Normal	212374	<0.001	<0.001	0.004	<0.001	0.002	<0.002	0.002	<0.002	<0.005	<0.005	0.014	<0.005	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.02
	MW129	17 Jun 2018	0083_MW129_13.5-14.0_1	Normal	212374	0.001	<0.001	0.012	<0.001	0.018	<0.002	0.008	0.002	0.013	0.004	0.016	0.003	0.004	<0.004	<0.01	<0.01	<0.05	<0.001	0.009	<0.001	<0.001	<0.02	<0.02
	MW129	28 Nov 2019	0083_MW129_5.5-6.0_191	Normal	EP1912600	<0.02	<0.02	0.04	<0.02	0.07	<0.02	<0.1	<0.02	0.07	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.30	<0.05	<0.05	<0.02	<0.05
	MW129	28 Nov 2019	0083_QC103_191128	Field Duplicate	EP1912600	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.91	<0.05	<0.05	<0.02	<0.05
	MW129	28 Nov 2019	0083_QC203_191128	Interlab Duplicate	691456	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.05	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.73	<0.01	<0.01	<0.05	<0.05
	MW129	23 Jun 2020	0083_MW129_200623	Normal	EP2006520	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	0.16	0.06	0.04	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	17 Nov 2020	0083_MW129_201117	Normal	EP2012743	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	17 Nov 2020	0083_QC102_201117	Field Duplicate	EP2012743	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	17 Nov 2020	0083_QC202_201117	Interlab Duplicate	758001	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW129	22 Jun 2021	0083_MW129_210622	Normal	EP2107184	<0.02	<0.02	0.03	<0.02	0.72	<0.02	<0.1	0.03	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	23 Nov 2021	0083_MW129_1.5-2_2111	Normal	EP2114300	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	21 Jun 2022	0083_MW129_220621	Normal	EP2207630	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	23 Nov 2022	0083_MW129_1.5-2.0_221	Normal	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW129	27 Jun 2023	0083_MW129_1.5-2.0_230	Normal	EP2308617	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Broader Area	MW130	17 Jun 2018	0083_MW130_1.4-1.9_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW130	17 Jun 2018	0083_MW130_3.4-3.9_180	Normal	212374	<0.001	<0.001	0.002	<0.001	0.005	<0.002	0.005	<0.002	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.02	<0.05	<0.001	0.004	<0.001	<0.001	<0.1	<0.1
	MW130	17 Jun 2018	0083_MW130_5.4-5.9_180	Normal	212374	<0.001	<0.001	0.002	<0.001	0.003	<0.002	0.003	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	0.002	<0.001	<0.001	<0.05	<0.02
	MW130	17 Jun 2018	0083_MW130_7.4-7.9_180	Normal	212374	<0.001	<0.001	<0.001	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.02
	MW130	28 Nov 2019	0083_MW130_3.4-3.9_191	Normal	EP1912600	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.25	<0.05	<0.05	<0.02	<0.05
	MW130	23 Jun 2020	0083_MW130_200623	Normal	EP2006455	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	17 Nov 2020	0083_MW130_201117	Normal	EP2012743	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	17 Nov 2020	0083_QC103_201117	Field Duplicate	EP2012743	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	17 Nov 2020	0083_QC203_201117	Interlab Duplicate	758001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW130	22 Jun 2021	0083_MW130_210622	Normal	EP2107184	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	23 Nov 2021	0083_MW130_3.4-3.9_211	Normal	EP2114296	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	21 Jun 2022	0083_MW130_220621	Normal	EP2207630	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	23 Nov 2022	0083_MW130_1.4-1.9_221	Normal	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	23 Nov 2022	0083_QC126_221123	Field Duplicate	EP2215820	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW130	23 Nov 2022	0083_QC226_221123	Interlab Duplicate	945147	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05
	MW130	27 Jun 2023	0083_MW130_3.4-3.9_230	Normal	EP2308617	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Broader Area	MW134	23 Jun 2018	0083_MW134_180623	Normal	212781	<0.001	<0.001	0.002	<0.001	0.005	<0.002	0.002	0.006	0.004	0.001	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.02	<0.01
	MW134	28 Nov 2019	0083

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
	MW134	**22 Jun 2021**	**0083_MW134_210622**	**Normal**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW134	**23 Nov 2021**	**0083_MW134_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW134	**21 Jun 2022**	**0083_MW134_220621**	**Normal**	**EP2207630**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW134	**23 Nov 2022**	**0083_MW134_221123**	**Normal**	**EP2215820**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW134	**27 Jun 2023**	**0083_MW134_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
POL Pathway	**MW202**	**03 Mar 2018**	**0083_AB20_180303**	**Normal**	**207818**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW202	**03 Mar 2018**	**0083_QC1212_180303**	**Field Duplicate**	**207818**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW202	**03 Mar 2018**	**0083_QC2212_180303**	**Interlab Duplicate**	**588874**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW202	**20 Jun 2018**	**0083_AB20_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	MW202	**28 Nov 2019**	**0083_AB20_191128**	**Normal**	**EP1912603**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**26 Jun 2020**	**0083_MW202_200626**	**Normal**	**EP2006686**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**18 Nov 2020**	**0083_MW202_201118**	**Normal**	**EP2012854**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**22 Jun 2021**	**0083_MW202_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**23 Nov 2021**	**0083_MW202_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**21 Jun 2022**	**0083_MW202_220621**	**Normal**	**EP2207626**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**25 Nov 2022**	**0083_MW202_221125**	**Normal**	**EP2215920**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**27 Jun 2023**	**0083_MW202_230627**	**Normal**	**EP2308611**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW202	**07 Nov 2023**	**0083_MW202_231107**	**Normal**	**EP2315664**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Pol Storage	**MW210**	**28 Feb 2018**	**0083_B02_180228**	**Normal**	**207612**	0.003	0.003	0.017	<0.001	0.002	<0.002	0.01	0.01	0.021	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW210	**13 Jun 2018**	**0083_B02_180613**	**Normal**	**212152**	0.005	0.007	0.076	<0.001	0.003	<0.002	0.028	0.041	0.058	0.012	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW210	**28 Nov 2019**	**0083_B02_191128**	**Normal**	**EP1912600**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	0.08	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**17 Mar 2020**	**B02_200317**	**Normal**	**EP2002947**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**26 Jun 2020**	**0083_MW210_200626**	**Normal**	**EP2006686**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**17 Nov 2020**	**0083_MW210_201117**	**Normal**	**EP2012749**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**22 Jun 2021**	**0083_MW210_210622**	**Normal**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**23 Nov 2021**	**0083_MW210_211123**	**Normal**	**EP2114296**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**23 Nov 2021**	**0083_QC112_211123**	**Field Duplicate**	**EP2114296**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**23 Nov 2021**	**0083_QC212_211123**	**Interlab Duplicate**	**844500**	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW210	**21 Jun 2022**	**0083_MW210_220621**	**Normal**	**EP2207624**	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	0.02	0.04	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**25 Nov 2022**	**0083_MW210_221125**	**Normal**	**EP2215920**	<0.02	<0.02	0.02	<0.02	0.09	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW210	**27 Jun 2023**	**0083_MW210_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.09	<0.02	0.05	<0.02	<0.1	0.12	0.10	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Pol Storage	**MW212**	**03 Mar 2018**	**0083_B04_180303**	**Normal**	**207818**	<0.001	<0.001	0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW212	**02 Jun 2018**	**0083_B04**	**Normal**	**211639**	<0.001	<0.001	0.006	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW212	**28 Nov 2019**	**0083_B04_191128**	**Normal**	**EP1912600**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	0.13	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**17 Mar 2020**	**B04_200317**	**Normal**	**EP2002947**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**17 Mar 2020**	**QC101_200317**	**Field Duplicate**	**EP2002947**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**17 Mar 2020**	**QC201_200317**	**Interlab Duplicate**	**709124**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW212	**26 Jun 2020**	**0083_MW212_200626**	**Normal**	**EP2006686**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**17 Nov 2020**	**0083_MW212_201117**	**Normal**	**EP2012749**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**17 Nov 2020**	**0083_QC104_201117**	**Field Duplicate**	**EP2012749**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**17 Nov 2020**	**0083_QC204_201117**	**Interlab Duplicate**	**758001**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW212	**22 Jun 2021**	**0083_MW212_210622**	**Normal**	**EP2107184**	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**22 Jun 2021**	**0083_QC105_210622**	**Field Duplicate**	**EP2107184**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**22 Jun 2021**	**0083_QC205_210622**	**Interlab Duplicate**	**805492**	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW212	**23 Nov 2021**	**0083_MW212_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**21 Jun 2022**	**0083_MW212_220621**	**Normal**	**EP2207624**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**21 Jun 2022**	**0083_QC111_220621**	**Field Duplicate**	**EP2207624**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**21 Jun 2022**	**0083_QC211_220621**	**Interlab Duplicate**	**901207**	0.003	0.004	0.041	<0.002	<0.004	<0.004	0.024	<0.002	0.001	0.006	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004
	MW212	**25 Nov 2022**	**0083_MW212_221125**	**Normal**	**EP2215920**	<0.02	<0.02	0.06	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW212	**27 Jun 2023**	**0083_MW212_230627**	**Normal**	**EP2308617**	<0.02	<0.02	0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse	**MW213**	**23 Feb 2018**	**0083_BDDBO5_180223**	**Normal**	**207359**	0.010	0.009	0.063	<0.001	0.027	<0.002	0.34	0.18	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW213	**16 Jun 2018**	**0083_BODB5_180616**	**Normal**	**212374**	0.012	0.009	0.071	<0.001	0.020	<0.002	0.020	<0.02	0.017	<0.01	0.004	<0.002	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.02
	MW213	**28 Nov 2019**	**0083_BDDBO5_191128**	**Normal**	**EP1912603**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**23 Jun 2021**	**0083_MW213_210623**	**Normal**	**EP2107188**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**23 Nov 2021**	**0083_MW213_211123**	**Normal**	**EP2114296**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**21 Jun 2022**	**0083_MW213_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.01	<0.02	0.01	<0.02	<0.1	0.02	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**23 Nov 2022**	**0083_MW213_221123**	**Normal**	**EP2215793**	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**27 Jun 2023**	**0083_MW213_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**27 Jun 2023**	**0083_QC112_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW213	**27 Jun 2023**	**0083_QC212_230627**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
Powerhouse	**MW214**	**27 Feb 2018**	**0083_B05_180227**	**Normal**	**207612**	0.009	0.004	0.017	<0.001	0.011	<0.002	0.027	0.008	0.01	0.01	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW214	**16 Jun 2018**	**0083_B05_180616**	**Normal**	**212374**	0.008	0.004	0.030	<0.001	0.013	<0.002	0.031	0.020	0.024	0.018	0.006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW214	**28 Nov 2019**	**0083_B05_191128**	**Normal**	**EP1912603**	<0.02	<0.02	0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**25 Jun 2020**	**0083_MW213_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.03	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**25 Jun 2020**	**0083_QC104_200625**	**Field Duplicate**	**EP2006683**	<0.02	<0.02	0.03	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**25 Jun 2020**	**0083_QC204_200625**	**Interlab Duplicate**	**729352**	<0.01	<0.01	0.01	<0.01	0.04	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW214	**18 Nov 2020**	**0083_MW213_201118**	**Normal**	**EP2012904**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**22 Jun 2021**	**0083_MW214_210622**	**Normal**	**EP2107095**	<0.02	<0.02	0.04	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**23 Nov 2021**	**0083_MW214_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**23 Nov 2021**	**0083_QC111_211123**	**Field Duplicate**	**EP2114296**	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**23 Nov 2021**	**0083_QC211_211123**	**Interlab Duplicate**	**844500**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW214	**21 Jun 2022**	**0083_MW214_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.03	<0.02	0.21	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**21 Jun 2022**	**0083_QC112_220621**	**Field Duplicate**	**EP2207630**	<0.02	<0.02	0.03	<0.02	0.22	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**21 Jun 2022**	**0083_QC212_220621**	**Interlab Duplicate**	**901207**	0.003	<0.002	0.035	0.006	0.16	<0.004	0.039	0.006	0.007	0.005	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004
	MW214	**23 Nov 2022**	**0083_MW214_221123**	**Normal**	**EP2215793**	<0.02	<0.02	0.02	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**23 Nov 2022**	**0083_QC127_221123**	**Field Duplicate**	**EP2215793**	<0.02	<0.02	0.02	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW214	**23 Nov 2022**	**0083_QC227_221123**	**Interlab Duplicate**	**945147**	<0.01	<0.01	0.02	<0.01	0.10	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW214	**27 Jun 2023**	**0083_MW214_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse Pathway	**MW217**	**02 Mar 2018**	**0083_B09_180302**	**Normal**	**207818**	<0.001	<0.001	0.001	<0.001	0.004	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW217	**16 Jun 2018**	**0083_B09_180618**	**Normal**	**212374**	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
	MW217	**21 Jun 2022**	**0083_MW217_220621**	**Normal**	**EP2207626**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
Powerhouse Pathway	**MW218**	**02 Mar 2018**	**0083_B10_180302**	**Normal**	**207818**	<0.001	<0.001	0.001	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	MW218	**16 Jun 2018**	**0083_B10_180618**	**Normal**	**212374**	<0.001	<0.001	0.001	<0.001	0.003	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW218	**18 Jun 2018**	**0083_QC157_180618**	**Field Duplicate**	**212374**	<0.001	<0.001	0.001	<0.001	0.002	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	MW218	**18 Jun 2018**	**0083_QC257_180618**	**Interlab Duplicate**	**604955**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	MW218	**28 Nov 2019**	**0083_B10_191128**	**Normal**	**EP1912604**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**26 Jun 2020**	**0083_MW218_200626**	**Normal**	**EP2006690**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**17 Nov 2020**	**0083_MW218_201117**	**Normal**	**EP2012743**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**22 Jun 2021**	**0083_MW218_210622**	**Normal**	**EP2107095**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**23 Nov 2021**	**0083_MW218_211123**	**Normal**	**EP2114296**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**21 Jun 2022**	**0083_MW218_220621**	**Normal**	**EP2207626**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**24 Nov 2022**	**0083_MW218_221124**	**Normal**	**EP2215848**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	MW218	**27 Jun 2023**	**0083_MW218_230627**	**Normal**	**EP2308621**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH002	**27 Feb 2018**	**0083_OTH002_180227**	**Normal**	**207612**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.003	<0.001	<0.001	<0.01	<0.005
	OTH002	**06 Jun 2018**	**0083_OTH002_180606**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.009	0.002	<0.001	<0.01	<0.005
	OTH002	**12 Jun 2018**	**0082_QC246_180612**	**Interlab Duplicate**	**604214**	<0.01	<0.01	<0.01	<0.01	0.25	<0.01	<0.05	<0.01	<0.01	<0.01	0.01	0.47	0.02	0.23	<0.01	<0.01	<0.01	<0.01	<0.05	0.02	<0.01	<0.05	<0.05
	OTH002	**27 Jun 2020**	**0083_OTH002_200627**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH002	**17 Nov 2020**	**0083_OTH002_201117**	**Normal**	**EP2012742**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH002	**22 Jun 2021**	**0083_OTH002_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH002	**22 Jun 2021**	**0083_QC103_210622**	**Field Duplicate**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH002	**22 Jun 2021**	**0083_QC203_210622**	**Interlab Duplicate**	**805492**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	OTH002	**23 Nov 2021**	**0083_OTH002_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**12 Feb 2018**	**0083_OTH101_180212**	**Normal**	**206780**	<0.0004	<0.001	0.001	<0.001	0.0030	<0.002	<0.002	<0.002	<0.0004	<0.0004	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.021	<0.0004	<0.001	<0.01	<0.005
	OTH101	**20 Jun 2018**	**0083_OTH101_A_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH101	**20 Jun 2018**	**0083_OTH101_B_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH101	**28 Nov 2019**	**0083_OTH101_191128**	**Normal**	**EP1912603**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**28 Jun 2020**	**0083_OTH101_200628**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**18 Nov 2020**	**0083_OTH101_201118**	**Normal**	**EP2012854**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**22 Jun 2021**	**0083_OTH101_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**24 Nov 2021**	**0083_OTH101_211124**	**Normal**	**EP2114391**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**21 Jun 2022**	**0083_OTH101_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**24 Nov 2022**	**0083_OTH101_221124**	**Normal**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH101	**27 Jun 2023**	**0083_OTH101_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**12 Feb 2018**	**0083_OTH102_180212**	**Normal**	**206780**	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	0.003	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005
	OTH102	**20 Jun 2018**	**0083_OTH102_A_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH102	**20 Jun 2018**	**0083_OTH102_B_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH102	**28 Nov 2019**	**0083_OTH102_191128**	**Normal**	**EP1912603**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**28 Jun 2020**	**0083_OTH102_200628**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**18 Nov 2020**	**0083_OTH102_201118**	**Normal**	**EP2012854**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**22 Jun 2021**	**0083_OTH102_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**23 Nov 2021**	**0083_OTH102_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**21 Jun 2022**	**0083_OTH102_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**25 Nov 2022**	**0083_OTH102_221125**	**Normal**	**EP2215921**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH102	**27 Jun 2023**	**0083_OTH102_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**12 Feb 2018**	**0083_OTH103_180212**	**Normal**	**206780**	<0.0004	<0.001	0.0020	<0.001	0.0040	<0.002	<0.002	<0.002	0.001	0.003	0.003	0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.0050	<0.0004	<0.001	<0.01	<0.005
	OTH103	**09 Jun 2018**	**0083_OTH103_A_180609**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH103	**09 Jun 2018**	**0083_OTH103_B_180609**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH103	**30 Nov 2019**	**0083_OTH103_191130**	**Normal**	**EP1912684**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**27 Jun 2020**	**0083_OTH103_200627**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**17 Nov 2020**	**0083_OTH103_201117**	**Normal**	**EP2012742**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**22 Jun 2021**	**0083_oth103_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**23 Nov 2021**	**0083_OTH103_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**21 Jun 2022**	**0083_OTH103_220621**	**Normal**	**EP2207634**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**25 Nov 2022**	**0083_OTH103_221125**	**Normal**	**EP2215920**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH103	**27 Jun 2023**	**0083_OTH103_230627**	**Normal**	**EP2308616**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**12 Feb 2018**	**0083_OTH104_180212**	**Normal**	**206780**	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005
	OTH104	**09 Jun 2018**	**0083_OTH104_A_180609**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH104	**09 Jun 2018**	**0083_OTH104_B_180609**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH104	**28 Nov 2019**	**0083_OTH104_191128**	**Normal**	**EP1912605**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**27 Jun 2020**	**0083_OTH104_200627**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**18 Nov 2020**	**0083_OTH104_201118**	**Normal**	**EP2012904**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**22 Jun 2021**	**0083_OTH104_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**23 Nov 2021**	**0083_OTH104_211123**	**Normal**	**EP2114295**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**21 Jun 2022**	**0083_OTH104_220621**	**Normal**	**EP2207634**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**24 Nov 2022**	**0083_OTH104_221124**	**Normal**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH104	**27 Jun 2023**	**0083_OTH104_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**21 Feb 2018**	**0083_OTH105_180221**	**Normal**	**207287**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH105	**09 Jun 2018**	**0083_OTH105_A_180609**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH105	**09 Jun 2018**	**0083_OTH105_B_180609**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH105	**28 Nov 2019**	**0083_OTH105_191128**	**Normal**	**EP1912605**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**27 Jun 2020**	**0083_OTH105_200627**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**17 Nov 2020**	**0083_OTH105_201117**	**Normal**	**EP2012742**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**22 Jun 2021**	**0083_OTH105_210622**	**Normal**	**EP2107095**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**23 Nov 2021**	**0083_OTH105_211123**	**Normal**	**EP2114301**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**21 Jun 2022**	**0083_OTH105_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**24 Nov 2022**	**0083_OTH105_221124**	**Normal**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**24 Nov 2022**	**0083_QC129_221124**	**Field Duplicate**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH105	**24 Nov 2022**	**0083_QC229_221124**	**Interlab Duplicate**	**945147**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	OTH105	**27 Jun 2023**	**0083_OTH105_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH106	**21 Feb 2018**	**0083_OTH106_180221**	**Normal**	**207287**	<0.001	<0.001	0.002	<0.001

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%										0.00023						19												
PFAS NEMP 2020 Recreational Water																**10**												
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																							
	OTH106	**22 Jun 2021**	**0083_OTH106_210622**	**Normal**	**EP2107095**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH106	**23 Nov 2021**	**0083_OTH106_211123**	**Normal**	**EP2114301**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH106	**21 Jun 2022**	**0083_OTH106_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH106	**24 Nov 2022**	**0083_OTH106_221124**	**Normal**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH106	**27 Jun 2023**	**0083_OTH106_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**12 Feb 2018**	**0083_OTH107_180212**	**Normal**	**206780**	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005
	OTH107	**23 Jun 2018**	**0083_OTH107_A_180623**	**Normal**	**212781**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	OTH107	**23 Jun 2018**	**0083_OTH107_B_180623**	**Normal**	**212781**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01
	OTH107	**23 Jun 2018**	**0083_QC778_180623**	**Interlab Duplicate**	**605978**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	OTH107	**28 Nov 2019**	**0083_OTH107_191128**	**Normal**	**EP1912605**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**27 Jun 2020**	**0083_OTH107_200627**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**17 Nov 2020**	**0083_OTH107_201117**	**Normal**	**EP2012742**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**22 Jun 2021**	**0083_OTH107_210622**	**Normal**	**EP2107095**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**23 Nov 2021**	**0083_OTH107_211123**	**Normal**	**EP2114301**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**21 Jun 2022**	**0083_OTH107_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**23 Nov 2022**	**0083_OTH107_221123**	**Normal**	**EP2215819**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH107	**27 Jun 2023**	**0083_OTH107_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**12 Feb 2018**	**0083_OTH108_180212**	**Normal**	**206780**	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005
	OTH108	**12 Feb 2018**	**0083_QC1201_180212**	**Field Duplicate**	**206780**	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005
	OTH108	**10 Jun 2018**	**0083_OTH108_A_180610**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH108	**10 Jun 2018**	**0083_OTH108_B_180610**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH108	**28 Nov 2019**	**0083_OTH108_191128**	**Normal**	**EP1912605**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**27 Jun 2020**	**0083_OTH108_200627**	**Normal**	**EP2006692**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**17 Nov 2020**	**0083_OTH108_201117**	**Normal**	**EP2012742**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**22 Jun 2021**	**0083_OTH108_210622**	**Normal**	**EP2107095**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**23 Nov 2021**	**0083_OTH108_211123**	**Normal**	**EP2114301**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**21 Jun 2022**	**0083_OTH108_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**23 Nov 2022**	**0083_OTH108_221123**	**Normal**	**EP2215819**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH108	**27 Jun 2023**	**0083_OTH108_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**20 Jun 2018**	**0083_OTH109_A_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH109	**20 Jun 2018**	**0083_OTH109_B_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH109	**28 Nov 2019**	**0083_OTH109_191128**	**Normal**	**EP1912600**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**26 Jun 2020**	**0083_OTH109_200626**	**Normal**	**EP2006686**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**18 Nov 2020**	**0083_OTH109_201118**	**Normal**	**EP2012854**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**22 Jun 2021**	**0083_OTH109_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**24 Nov 2021**	**0083_OTH109_211124**	**Normal**	**EP2114391**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**21 Jun 2022**	**0083_OTH109_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**24 Nov 2022**	**0083_OTH109_221124**	**Normal**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH109	**27 Jun 2023**	**0083_OTH109_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**20 Jun 2018**	**0083_OTH110_A_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH110	**20 Jun 2018**	**0083_OTH110_B_180620**	**Normal**	**212571**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01
	OTH110	**28 Nov 2019**	**0083_OTH110_191128**	**Normal**	**EP1912600**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**26 Jun 2020**	**0083_OTH110_200626**	**Normal**	**EP2006686**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**18 Nov 2020**	**0083_OTH110_201118**	**Normal**	**EP2012904**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**22 Jun 2021**	**0083_OTH110_210622**	**Normal**	**EP2107185**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**24 Nov 2021**	**0083_OTH110_211124**	**Normal**	**EP2114391**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**21 Jun 2022**	**0083_OTH110_220621**	**Normal**	**EP2207627**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**24 Nov 2022**	**0083_OTH110_221124**	**Normal**	**EP2215870**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH110	**27 Jun 2023**	**0083_OTH110_230627**	**Normal**	**EP2308612**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**10 Jun 2018**	**0082_QC257_180610**	**Interlab Duplicate**	**604115**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05
	OTH113	**10 Jun 2018**	**0083_OTH113_A_180610**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH113	**10 Jun 2018**	**0083_OTH113_B_180610**	**Normal**	**212095**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH113	**10 Jun 2018**	**0083_QC157_180310**	**Field Duplicate**	**212095**	<0.001	<0.001	<0.001	<0.001	0.004	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005
	OTH113	**28 Nov 2019**	**0083_OTH113_191128**	**Normal**	**EP1912600**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**28 Jun 2020**	**0083_OTH113_200628**	**Normal**	**EP2006748**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**17 Nov 2020**	**0083_OTH113_201117**	**Normal**	**EP2012743**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**22 Jun 2021**	**0083_OTH113_210622**	**Normal**	**EP2107184**	<0.02	<0.02	0.02	<0.02	0.54	<0.02	<0.1	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**16 May 2022**	**0083_OTH113_220516**	**Normal**	**EP2205863**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**21 Jun 2022**	**0083_OTH113_220621**	**Normal**	**EP2207632**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**23 Nov 2022**	**0083_OTH113_221123**	**Normal**	**EP2215816**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05
	OTH113	**27 Jun 2023**	**0083_OTH113_230627**	**Normal**	**EP2308617**	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

First Time Detect of PFOA or PFHxS+PFOS

New Exceedance of Guideline Value

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals								
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
Pol Storage	**MW004**	**23 Nov 2021**	**0083_MW004_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.24	0.28	0.28		272		765		265		5,510
	MW004	**21 Jun 2022**	**0083_MW004_220621**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.37	0.45	0.45		27		7		2		6
	MW004	**25 Nov 2022**	**0083_MW004_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	0.20	0.29	0.29		62		46		21		308
	MW004	**27 Jun 2023**	**0083_MW004_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.09	0.09		104		114		43		743
Pol Storage	**MW008**	**28 Feb 2018**	**0083_MW8_180228**	**Normal**	**207612**	0.003	<0.005	<0.01	<0.002	<0.05					240		620		180		5,000
	MW008	**16 Jun 2018**	**0083_MW8_180616**	**Normal**	**212374**	<0.002	<0.01	<0.05	<0.004	<0.05					190		370		110		3,400
	MW008	**30 Nov 2019**	**0083_MW8_7.5-8.0_19113**	**Normal**	**EP1912681**	<0.02	<0.05	<0.05	<0.02	<0.05	**8.92**	16.3	16.6		161		308		116		2,360
	MW008	**17 Mar 2020**	**MW08_200317**	**Normal**	**EP2002947**	<0.02	<0.05	<0.05	<0.02	<0.05	0.62	0.79	0.79								
	MW008	**26 Jun 2020**	**0083_MW008_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	**8.54**	12.4	12.6		214		441		156		3,360
	MW008	**26 Jun 2020**	**0083_QC101_200626**	**Field Duplicate**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	**8.28**	12.0	12.2		271		606		249		4,540
	MW008	**26 Jun 2020**	**0083_QC201_200626**	**Interlab Duplicate**	**729409**	<0.05	<0.05	<0.05	<0.05	<0.05	**7.05**	9.69	9.85	280		540		170		4,400	
	MW008	**17 Nov 2020**	**0083_MW008_201117**	**Normal**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	0.40	0.40	0.40		269		732		282		5,250
	MW008	**22 Jun 2021**	**0083_MW008_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.28	0.28		294		784		306		5,590
	MW008	**23 Nov 2021**	**0083_MW008_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.38	0.38	0.38		262		767		255		5,400
	MW008	**21 Jun 2022**	**0083_MW008_220621**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.62	0.62	0.62		305		802		303		5,410
	MW008	**21 Jun 2022**	**0083_QC108_220621**	**Field Duplicate**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.63	0.63	0.63		320		856		324		5,850
	MW008	**21 Jun 2022**	**0083_QC208_220621**	**Interlab Duplicate**	**901207**	<0.004	<0.008	<0.004	<0.004	<0.008	0.45	0.48	0.49								
	MW008	**25 Nov 2022**	**0083_MW008_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	0.33	0.35	0.35		298		813		290		6,000
Powerhouse	**MW017**	**28 Feb 2018**	**0083_MW17_180228**	**Normal**	**207612**	<0.01	<0.02	<0.05	<0.01	<0.2					260		610		220		5,400
	MW017	**16 Jun 2018**	**0083_MW17_180616**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.004	<0.05					270		620		220		5,500
	MW017	**28 Nov 2019**	**0083_MW17_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	**17.2**	40.1	40.9		341		801		352		5,910
	MW017	**25 Jun 2020**	**0083_MW017_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	**11.5**	29.0	29.4		274		577		256		4,350
	MW017	**25 Jun 2020**	**0083_QC103_200625**	**Field Duplicate**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	**11.9**	29.2	29.5		259		550		245		4,160
	MW017	**25 Jun 2020**	**0083_QC203_200625**	**Interlab Duplicate**	**729352**	<0.05	<0.05	<0.05	<0.05	<0.05	**10.5**	18.9	19.37	270		560		190		4,600	
	MW017	**18 Nov 2020**	**0083_MW017_201118**	**Normal**	**EP2012802**	<0.02	<0.05	<0.05	<0.02	<0.05	**17.0**	31.1	31.4		238		494		232		3,700
	MW017	**22 Jun 2021**	**0083_MW017_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	**10.7**	22.9	23.1		316		707		312		5,100
	MW017	**23 Nov 2021**	**0083_MW017_211123**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	**15.2**	27.5	27.7		300		647		265		4,690
	MW017	**21 Jun 2022**	**0083_MW017_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	**12.0**	42.1	42.5		214		412		178		2,740
	MW017	**21 Jun 2022**	**0083_QC113_220621**	**Field Duplicate**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	**9.75**	44.6	45.0		292		628		286		4,400
	MW017	**21 Jun 2022**	**0083_QC213_220621**	**Interlab Duplicate**	**901207**	<0.004	<0.008	<0.004	<0.004	<0.008	0.81	4.3	4.8								
	MW017	**24 Nov 2022**	**0083_MW017_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	**13.4**	25.6	25.8		276		618		272		4,930
	MW017	**24 Nov 2022**	**0083_QC128_221124**	**Field Duplicate**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	**11.9**	24.3	24.5		271		597		262		4,670
	MW017	**24 Nov 2022**	**0083_QC228_221124**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	**16.1**	27	27.25								
	MW017	**27 Jun 2023**	**0083_MW017_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	**15.1**	28.2	28.5		277		568		218		4,230
	MW017	**27 Jun 2023**	**0083_QC114_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	**9.51**	51.3	51.5		217		410		154		2,940
	MW017	**27 Jun 2023**	**0083_QC214_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.05	<0.05	**9**	56.48	56.8								
Powerhouse	**MW019**	**23 Feb 2018**	**0083_MW19_180223**	**Normal**	**207359**	<0.002	<0.005	<0.01	<0.002	<0.05					150		300		98		2,500
	MW019	**16 Jun 2018**	**0083_MW19_180616**	**Normal**	**212374**	<0.02	<0.1	<0.2	<0.04	<0.1					250		600		190		5,000
	MW019	**17 Mar 2020**	**MW19_200317**	**Normal**	**EP2002947**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.11	0.11								
	MW019	**25 Jun 2020**	**0083_MW019_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.10	0.12	0.12		212		482		211		3,740
	MW019	**18 Nov 2020**	**0083_MW019_201118**	**Normal**	**EP2012802**	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03		282		710		314		5,470
	MW019	**23 Jun 2021**	**0083_MW019_210623**	**Normal**	**EP2107188**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		286		718		306		5,570
	MW019	**23 Nov 2021**	**0083_MW019_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06		184		442		171		3,310
	MW019	**21 Jun 2022**	**0083_MW019_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	0.11	0.11		142		194		85		1,230
	MW019	**23 Nov 2022**	**0083_MW019_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.14	0.14		408		897		352		6,790
	MW019	**27 Jun 2023**	**0083_MW019_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.21	0.21		256		517		185		3,950
	MW019	**27 Jun 2023**	**0083_QC113_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.18	0.18		313		696		251		5,360
	MW019	**27 Jun 2023**	**0083_QC213_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.12	0.12								
Powerhouse	**MW027**	**23 Feb 2018**	**0083_MW27_180223**	**Normal**	**207359**	<0.002	0.01	<0.01	<0.002	<0.05					210		360		110		3,000
	MW027	**16 Jun 2018**	**0083_MW27_180616**	**Normal**	**212374**	<0.004	<0.02	<0.05	<0.004	<0.05					260		530		170		4,800
	MW027	**28 Nov 2019**	**0083_MW27_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	0.39	0.78	0.78		318		637		257		4,610
	MW027	**28 Nov 2019**	**0083_QC101_191128**	**Field Duplicate**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	0.43	1.07	1.07		316		631		254		4,540
	MW027	**28 Nov 2019**	**0083_QC201_191128**	**Interlab Duplicate**	**691456**	<0.05	<0.05	<0.05	<0.05	<0.05	0.31	0.81	0.83	250		480		150		3,900	
	MW027	**25 Jun 2020**	**0083_MW027_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.33	0.57	0.57		260		487		209		3,680
	MW027	**18 Nov 2020**	**0083_MW027_201118**	**Normal**	**EP2012802**	<0.02	<0.05	<0.05	<0.02	<0.05	0.33	0.50	0.50		295		624		272		4,760
	MW027	**23 Jun 2021**	**0083_MW027_210623**	**Normal**	**EP2107188**	<0.02	<0.05	<0.05	<0.02	<0.05	0.27	0.34	0.34		341		730		304		5,580
	MW027	**23 Nov 2021**	**0083_MW027_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.56	1.11	1.11		198		316		117		2,320
	MW027	**21 Jun 2022**	**0083_MW027_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	1.60	2.14	2.16		234		327		127		2,400
	MW027	**23 Nov 2022**	**0083_MW027_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.05	<0.02	<0.05	0.20	0.28	0.28		307		630		253		4,820
	MW027	**23 Nov 2022**	**0083_QC124_221123**	**Field Duplicate**	**EP2215793**	<0.02	<0.05	<0.05	<0.02	<0.05	0.23	0.34	0.34								
	MW027	**23 Nov 2022**	**0083_QC224_221123**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	0.17	0.29	0.29								
	MW027	**27 Jun 2023**	**0083_MW027_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	**2.03**	3.93	4.06		292		605		245		4,550
	MW027	**27 Jun 2023**	**0083_QC111_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.84	1.44	1.46		303		665		268		5,020
	MW027	**27 Jun 2023**	**0083_QC211_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.05	<0.05	0.73	1.46	1.51								
Powerhouse	**MW101**	**28 Feb 2018**	**0083_MW101_180228**	**Normal**	**207612**	<0.1	<0.02	<0.5	<0.1	<0.2					160		460		140		4,100
	MW101	**28 Feb 2018**	**0083_QC2301_180228**	**Interlab Duplicate**	**588076**	<0.05	<0.05	<0.05	<0.05	<0.05	0.44	1.28	1.32	190		530		160		4,300	
	MW101	**16 Jun 2018**	**0083_MW101_180616**	**Normal**	**212374**	<0.04	<0.2	<0.1	<0.04	<0.5					150		370		110		3,300
	MW101	**25 Jun 2020**	**0083_MW101_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.24	0.40	0.40		202		611		249		4,550
	MW101	**25 Jun 2020**	**0083_QC102_200625**	**Field Duplicate**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.20	1.75	1.75		208		624		258		4,650
	MW101	**25 Jun 2020**	**0083_QC202_200625**	**Interlab Duplicate**	**729352**	<0.05	<0.05	<0.05	<0.05	<0.05	0.21	0.95	0.95	210		630		190		5,000	
	MW101	**18 Nov 2020**	**0083_MW101_201118**	**Normal**	**EP2012802**	<0.02	<0.05	<0.05	<0.02	<0.05	0.25	0.59	0.59		218		651		267		4,760
	MW101	**23 Jun 2021**	**0083_MW101_210623**	**Normal**	**EP2107188**	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	0.90	0.90		182		542		213		4,020
	MW101	**23 Nov 2021**	**0083_MW101_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	0.28	0.64	0.64		190		629		221		4,440
	MW101	**21 Jun 2022**	**0083_MW101_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	0.82	0.82		63		140		66		1,010
	MW101	**24 Nov 2022**	**0083_MW101_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	0.59	0.59		176		510		202		4,000
	MW101	**27 Jun 2023**	**0083_MW101_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.17	0.44	0.44		227		696		271		5,080
Powerhouse	**MW102**	**28 Feb 2018**	**0083_MW102_180228**	**Normal**	**207612**	<0.01	<0.02	<0.05	<0.01	<0.2					180		310		110		2,800
	MW102	**16 Jun 2018**	**0083_MW102_180616**	**Normal**	**212374**	<0.02	<0.05	<0.1	<0.02	<0.1					190		350		120		3,300
	MW102	**25 Jun 2020**	**0083_MW102_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.22	0.55	0.55		257		562		249		4,430
	MW102	**18 Nov 2020**	**0083_MW102_201118**	**Normal**	**EP2012802**	<0.02	<0.05	<0.05	<0.02	<0.05	0.45	1.55	1.58		254		525		233		4,050
	MW102	**22 Jun 2021**	**0083_MW102_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.36	2.29	2.29		143		268		123		2,010
	MW102	**23 Nov 2021**	**0083_MW102_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	0.38	1.09	1.09		234		542		201		3,990
	MW102	**21 Jun 2022**	**0083_MW102_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.99	2.07	2.38		74		77		28		491
	MW102	**24 Nov 2022**	**0083_MW102_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	0.48	0.94	1.00		235		475		185		3,640
	MW102	**27 Jun 2023**	**0083_MW102_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	0.91	0.94		258		584		245		4,340

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals								
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
Powerhouse	**MW103**	**28 Feb 2018**	**0083_MW103_180228**	**Normal**	**207612**	<0.01	<0.02	<0.05	<0.01	<0.2					180		280		92		2,200
	MW103	**16 Jun 2018**	**0083_MW103_180616**	**Normal**	**212374**	<0.002	<0.01	<0.02	<0.002	<0.05					190		320		110		2,800
	MW103	**16 Jun 2018**	**0083_QC149_180616**	**Field Duplicate**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					200		340		110		2,900
	MW103	**16 Jun 2018**	**0083_QC249_180616**	**Interlab Duplicate**	**604955**	<0.05	<0.05	<0.05	<0.05	<0.05	1.24	6.48	6.65	240		370		130		3,200	
	MW103	**28 Nov 2019**	**0083_MW103_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	1.23	7.26	7.52		190		318		123		2,320
	MW103	**28 Nov 2019**	**0083_QC102_191128**	**Field Duplicate**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	1.12	7.35	7.54		192		326		126		2,410
	MW103	**28 Nov 2019**	**0083_QC202_191128**	**Interlab Duplicate**	**691456**	<0.05	<0.05	<0.05	<0.05	<0.05	0.98	6.47	6.76	230		300		92		2,300	
	MW103	**25 Jun 2020**	**0083_MW103_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.68	3.58	3.69		233		422		183		3,180
	MW103	**18 Nov 2020**	**0083_MW103_201118**	**Normal**	**EP2012802**	<0.02	<0.05	<0.05	<0.02	<0.05	0.51	2.89	2.96		261		500		220		3,720
	MW103	**22 Jun 2021**	**0083_MW103_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.59	4.19	4.27		226		404		185		3,020
	MW103	**22 Jun 2021**	**0083_QC106_210622**	**Field Duplicate**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.61	4.47	4.55		261		544		218		4,310
	MW103	**22 Jun 2021**	**0083_QC206_210622**	**Interlab Duplicate**	**805492**	<0.05	<0.05	<0.05	<0.05	<0.05	0.59	3.94	4.04	280		550		200		4,900	
	MW103	**23 Nov 2021**	**0083_MW103_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	0.64	3.87	3.97		258		513		190		3,630
	MW103	**21 Jun 2022**	**0083_MW103_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.41	2.00	2.05		243		470		212		3,300
	MW103	**24 Nov 2022**	**0083_MW103_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	0.60	2.85	2.92		236		448		175		3,310
	MW103	**27 Jun 2023**	**0083_MW103_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.78	3.78	3.88		275		511		213		3,770
Powerhouse	**MW104**	**28 Feb 2018**	**0083_MW104_5.5-6.0_180**	**Normal**	**207612**	<0.002	<0.005	<0.01	<0.002	<0.05					770		2,000		640		18,000
	MW104	**28 Feb 2018**	**0083_MW104_7.5-8.0_180**	**Normal**	**207612**	<0.002	0.008	<0.01	<0.002	<0.05					140		330		110		2,700
	MW104	**28 Feb 2018**	**0083_MW104_9.5-10.0_18**	**Normal**	**207612**	<0.002	<0.005	<0.01	<0.002	<0.05					280		710		240		6,300
	MW104	**18 Jun 2018**	**0083_MW104_3.5-4.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					200		220		59		1,400
	MW104	**18 Jun 2018**	**0083_MW104_5.5-6.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					200		320		93		2,400
	MW104	**18 Jun 2018**	**0083_MW104_7.5-8.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					150		340		110		2,700
	MW104	**18 Jun 2018**	**0083_MW104_9.5-10.0_18**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					290		730		230		6,200
	MW104	**28 Nov 2019**	**0083_MW104_5.5-6.0_191**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01		179		360		127		2,440
	MW104	**25 Jun 2020**	**0083_MW104_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		193		391		159		2,580
	MW104	**18 Nov 2020**	**0083_MW104_201118**	**Normal**	**EP2012904**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		179		383		143		2,620
	MW104	**22 Jun 2021**	**0083_MW104_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		189		393		173		2,660
	MW104	**22 Jun 2021**	**0083_QC107_210622**	**Field Duplicate**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		235		428		188		3,100
	MW104	**22 Jun 2021**	**0083_QC207_210622**	**Interlab Duplicate**	**805492**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	230		400		140		3,300	
	MW104	**23 Nov 2021**	**0083_MW104_5.5-6_2111**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		258		465		185		2,970
	MW104	**23 Nov 2021**	**0083_QC214_211123**	**Interlab Duplicate**	**844500**	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.1								
	MW104	**21 Jun 2022**	**0083_MW104_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		166		158		44		726
	MW104	**24 Nov 2022**	**0083_MW104_5.5-6.0_221**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		246		412		155		3,010
	MW104	**27 Jun 2023**	**0083_MW104_5.5-6.0_230**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		250		431		171		3,020
Pol Storage	**MW105**	**03 Mar 2018**	**0083_MW105_2.0-2.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	1.2				120		82		33		810
	MW105	**03 Mar 2018**	**0083_MW105_4.0-4.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	0.2				240		640		190		5,400
	MW105	**03 Mar 2018**	**0083_MW105_6.0-6.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	0.2				370		630		180		6,600
	MW105	**03 Mar 2018**	**0083_MW105_8.0-8.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				290		760		230		6,600
	MW105	**02 Jun 2018**	**0083_MW105-4.0-4.5_180**	**Normal**	**211639**	<0.002	<0.005	<0.01	<0.002	<0.05	0.25				250		680		200		5,500
	MW105	**02 Jun 2018**	**0083_MW105-6.0-6.5_180**	**Normal**	**211639**	<0.002	<0.005	<0.01	<0.002	<0.05	0.11				330		740		210		6,600
	MW105	**02 Jun 2018**	**0083_MW105-8.0-8.5_180**	**Normal**	**211639**	<0.002	<0.005	<0.01	<0.002	<0.05	0.038				280		790		230		6,600
	MW105	**28 Nov 2019**	**0083_MW105_4.0-4.5_191**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	0.40	1.30	1.30		312		815		312		5,740
	MW105	**26 Jun 2020**	**0083_MW105_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	0.14	0.42	0.42		273		704		293		5,180
	MW105	**17 Nov 2020**	**0083_MW105_201117**	**Normal**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	0.31	1.27	1.27		287		771		305		5,500
	MW105	**17 Nov 2020**	**0083_QC106_201117**	**Field Duplicate**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	0.32	1.50	1.50		292		773		317		5,700
	MW105	**17 Nov 2020**	**0083_QC206_201117**	**Interlab Duplicate**	**758001**	<0.05	<0.05	<0.05	<0.05	<0.05	0.44	1.8	1.81	320		750		230		4,800	
	MW105	**22 Jun 2021**	**0083_MW105_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		288		789		309		5,480
	MW105	**23 Nov 2021**	**0083_MW105_6-6.5_2111**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.13	0.26	0.26		280		814		283		5,820
	MW105	**21 Jun 2022**	**0083_MW105_4-4.5_2206**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.17	0.53	0.53		325		845		321		5,710
	MW105	**25 Nov 2022**	**0083_MW105_4.0-4.5_221**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.47	0.47		315		831		301		6,200
	MW105	**27 Jun 2023**	**0083_MW105_4.0-4.5_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	0.13	0.25	0.25		280		822		291		5,720
POL Pathway	**MW107**	**03 Mar 2018**	**0083_MW107_3.1-4.1_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	0.4				130		290		97		2,500
	MW107	**03 Mar 2018**	**0083_MW107_5.5-6.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		11,000
	MW107	**03 Mar 2018**	**0083_MW107_7.5-8.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	0.1				420		1,300		390		11,000
	MW107	**17 Jun 2018**	**0083_MW107_5.5-6.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.01	<0.002	<0.05					400		1,300		370		11,000
	MW107	**17 Jun 2018**	**0083_MW107_7.5-8.0_180**	**Normal**	**212374**	<0.002	0.006	<0.01	<0.002	<0.05					410		1,300		370		11,000
	MW107	**30 Nov 2019**	**0083_MW107_5.5-6.0_191**	**Normal**	**EP1912681**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		487		1,610		662		12,100
	MW107	**26 Jun 2020**	**0083_MW107_7.5_200626**	**Normal**	**EP2006690**	<0.02	<0.05	<0.05	<0.02	<0.05	0.39	0.39	0.39		641		1,140		521		10,200
	MW107	**17 Nov 2020**	**0083_MW107_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05		498		1,450		621		11,300
	MW107	**22 Jun 2021**	**0083_MW107_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05		492		1,520		658		11,700
	MW107	**23 Nov 2021**	**0083_MW107_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03		402		1,350		509		10,400
	MW107	**21 Jun 2022**	**0083_MW107_5.5-6_2206**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		411		1,260		511		9,300
	MW107	**25 Nov 2022**	**0083_MW107_3.1-4.1_221**	**Normal**	**EP2215976**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		407		1,250		506		9,740
	MW107	**27 Jun 2023**	**0083_MW107_3.1-4.1_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		413		1,340		522		10,100
POL Pathway	**MW109**	**01 Mar 2018**	**0083_MW109_6.5-7.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				340		1,000		290		8,800
	MW109	**01 Mar 2018**	**0083_MW109_9.3-9.8_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				390		1,300		390		11,000
	MW109	**20 Jun 2018**	**0083_MW109_6.5-7.0_180**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				390		1,300		380		11,000
	MW109	**20 Jun 2018**	**0083_MW109_9.3-9.8_180**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	0.002				400		1,300		420		12,000
	MW109	**30 Nov 2019**	**0083_MW109_6.5-7.0_191**	**Normal**	**EP1912681**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		468		1,600		664		12,200
	MW109	**28 Jun 2020**	**0083_MW109_200628**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		490		1,480		629		11,500
	MW109	**18 Nov 2020**	**0083_MW109_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		450		1,440		536		11,200
	MW109	**22 Jun 2021**	**0083_MW109_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		448		1,440		614		11,000
	MW109	**24 Nov 2021**	**0083_MW109_211124**	**Normal**	**EP2114519**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		434		1,410		567		11,100
	MW109	**21 Jun 2022**	**0083_MW109_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		444		1,300		560		9,440
	MW109	**25 Nov 2022**	**0083_MW109_6.5-7.0_221**	**Normal**	**EP2215976**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		257		697		292		5,520
	MW109	**27 Jun 2023**	**0083_MW109_6.5-7.0_230**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		404		1,280		526		9,920
POL Pathway	**MW110**	**01 Mar 2018**	**0083_MW110_7.5-8.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				150		360		130		3,600
	MW110	**01 Mar 2018**	**0083_MW110_9.0-9.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				370		1,200		360		11,000
	MW110	**20 Jun 2018**	**0083_MW110_7.5-8.0_180**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	0.002				230		620		210		5,900
	MW110	**20 Jun 2018**	**0083_MW110_9.0-9.5_180**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	0.007				390		1,300		400		12,000
	MW110	**26 Jun 2020**	**0083_MW110_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		481		1,380		523		10,800
	MW110	**18 Nov 2020**	**0083_MW110_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		475		1,390		518		10,800
	MW110	**22 Jun 2021**	**0083_MW110_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		466		1,420		605		10,800
	MW110	**24 Nov 2021**	**0083_MW110_211124**	**Normal**	**EP2114519**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		484		1,490		594		11,600
	MW110	**21 Jun 2022**	**0083_MW110_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		377		1,080		464		7,740

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals								
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
	MW110	**25 Nov 2022**	**0083_MW110_7.5-8.0_221**	**Normal**	**EP2215976**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		246		559		254		4,740
	MW110	**27 Jun 2023**	**0083_MW110_9.0-9.5_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		206		446		202		3,550
POL Pathway	**MW111**	**03 Mar 2018**	**0083_MW111_8.5-9.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				350		1,100		300		9,300
	MW111	**03 Mar 2018**	**0083_MW111_10.5-11.0_1**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,400		410		12,000
	MW111	**17 Jun 2018**	**0083_MW111_8.5-9.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.01	<0.002	<0.05					350		1,100		310		9,300
	MW111	**17 Jun 2018**	**0083_MW111_10.5-11.0_1**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					390		1,300		360		11,000
	MW111	**17 Jun 2018**	**0083_QC155_180617**	**Field Duplicate**	**212374**	<0.002	<0.01	<0.02	<0.002	<0.05					400		1,300		370		11,000
	MW111	**17 Jun 2018**	**0083_QC255_180617**	**Interlab Duplicate**	**604955**	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	<0.05	<0.1	450		1,300		420		12,000	
	MW111	**28 Nov 2019**	**0083_MW111_8.5-9.0_191**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		367		1,150		453		8,670
	MW111	**26 Jun 2020**	**0083_MW111_10.5_20062**	**Normal**	**EP2006690**	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01		402		1,010		482		8,180
	MW111	**18 Nov 2020**	**0083_MW111_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		443		1,180		594		9,500
	MW111	**22 Jun 2021**	**0083_MW111_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		496		1,440		636		11,000
	MW111	**23 Nov 2021**	**0083_MW111_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		421		1,380		524		10,700
	MW111	**21 Jun 2022**	**0083_MW111_10.5-11_22(**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		535		1,600		692		11,900
	MW111	**21 Jun 2022**	**0083_QC114_220621**	**Field Duplicate**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02								
	MW111	**21 Jun 2022**	**0083_QC214_220621**	**Interlab Duplicate**	**901207**	<0.004	<0.008	<0.004	<0.004	<0.008	1.9	1.9	1.9								
	MW111	**25 Nov 2022**	**0083_MW111_8.5-9.0_221**	**Normal**	**EP2215976**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		336		965		391		7,550
	MW111	**27 Jun 2023**	**0083_MW111_8.5-9.0_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		367		1,120		426		8,360
POL Pathway	**MW112**	**03 Mar 2018**	**0083_MW112_2.0-3.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				440		1,200		380		11,000
	MW112	**03 Mar 2018**	**0083_MW112_4.5-5.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				430		1,300		400		11,000
	MW112	**03 Mar 2018**	**0083_MW112_6.5-7.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				450		1,400		420		12,000
	MW112	**03 Mar 2018**	**0083_MW112_8.5-9.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				470		1,200		350		11,000
	MW112	**17 Jun 2018**	**0083_MW112_2.0-3.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.01	<0.002	<0.05					260		690		230		6,400
	MW112	**17 Jun 2018**	**0083_MW112_4.5-5.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					410		1,300		370		11,000
	MW112	**17 Jun 2018**	**0083_MW112_6.5-7.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					410		1,300		360		11,000
	MW112	**17 Jun 2018**	**0083_MW112_8.5-9.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					460		1,300		360		11,000
	MW112	**28 Nov 2019**	**0083_MW112_4.5-5.0_191**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.05	0.05		482		1,440		612		11,000
	MW112	**26 Jun 2020**	**0083_MW112_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.19	0.19		464		1,380		526		10,800
	MW112	**18 Nov 2020**	**0083_MW112_201118**	**Normal**	**EP2012904**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		461		1,460		545		11,300
	MW112	**22 Jun 2021**	**0083_MW112_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		481		1,500		653		11,500
	MW112	**23 Nov 2021**	**0083_MW112_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		420		1,430		540		11,200
	MW112	**21 Jun 2022**	**0083_MW112_4.5-5_2206**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		493		1,560		663		11,500
	MW112	**24 Nov 2022**	**0083_MW112_2.0-3.0_221**	**Normal**	**EP2215871**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		193		427		165		3,240
	MW112	**27 Jun 2023**	**0083_MW112_4.5-5.0_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		422		1,390		539		10,400
Powerhouse Pathway	**MW113**	**01 Mar 2018**	**0083_MW113_2.5-3.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				400		1,300		380		11,000
	MW113	**01 Mar 2018**	**0083_MW113_5.0-5.5_180**	**Normal**	**207818**	<0.02	<0.005	<0.01	<0.02	<0.05	<0.001				520		1,100		320		11,000
	MW113	**01 Mar 2018**	**0083_MW113_7.0-7.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				420		1,200		380		11,000
	MW113	**17 Jun 2018**	**0083_MW113_2.5-3.5_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					390		1,200		360		11,000
	MW113	**17 Jun 2018**	**0083_MW113_5.0-5.5_180**	**Normal**	**212374**	<0.004	<0.005	<0.02	<0.004	<0.05					520		1,200		330		12,000
	MW113	**17 Jun 2018**	**0083_MW113_7.0-7.5_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					430		1,300		410		11,000
	MW113	**28 Nov 2019**	**0083_MW113_2.5-3.5_191**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		453		1,330		586		10,300
	MW113	**25 Jun 2020**	**0083_MW113_200625**	**Normal**	**EP2006594**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		427		1,350		503		10,500
	MW113	**18 Nov 2020**	**0083_MW113_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		444		1,410		524		10,900
	MW113	**22 Jun 2021**	**0083_MW113_2.5-3.5_210**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		491		1,520		655		11,600
	MW113	**23 Nov 2021**	**0083_MW113_2.5-3.5_211**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		447		1,380		552		10,600
	MW113	**21 Jun 2022**	**0083_MW113_2.5-3.5_220**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		252		706		307		5,120
	MW113	**24 Nov 2022**	**0083_MW113_2.5-3.5_221**	**Normal**	**EP2215871**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		265		766		309		6,020
	MW113	**27 Jun 2023**	**0083_MW113_2.5-3.5_230**	**Normal**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		346		1,100		446		8,500
Powerhouse Pathway	**MW114**	**01 Mar 2018**	**0083_MW114_2.0-3.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				560		1,200		320		11,000
	MW114	**01 Mar 2018**	**0083_MW114_4.5-5.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				400		1,300		380		11,000
	MW114	**01 Mar 2018**	**0083_MW114_6.5-7.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		380		11,000
	MW114	**01 Mar 2018**	**0083_MW114_8.5-9.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		380		11,000
	MW114	**17 Jun 2018**	**0083_MW114_2.0-3.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.004	<0.05					410		1,300		380		10,000
	MW114	**17 Jun 2018**	**0083_MW114_4.5-5.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					410		1,300		370		11,000
	MW114	**17 Jun 2018**	**0083_MW114_6.5-7.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					400		1,200		360		11,000
	MW114	**17 Jun 2018**	**0083_MW114_8.5-9.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					390		1,200		370		11,000
	MW114	**28 Nov 2019**	**0083_MW114_2.0-3.0_191**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		411		1,320		566		9,900
	MW114	**25 Jun 2020**	**0083_MW114_200625**	**Normal**	**EP2006594**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		456		1,430		528		11,200
	MW114	**18 Nov 2020**	**0083_MW114_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		482		1,480		553		11,400
	MW114	**22 Jun 2021**	**0083_MW114_2.0-3.0_210**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		390		1,220		490		9,040
	MW114	**23 Nov 2021**	**0083_MW114_2.0-3.0_211**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		470		1,460		589		11,200
	MW114	**21 Jun 2022**	**0083_MW114_2-3_220621**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		503		1,570		669		11,600
	MW114	**24 Nov 2022**	**0083_MW114_4.5-5.0_221**	**Normal**	**EP2215871**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		482		1,480		619		11,800
	MW114	**27 Jun 2023**	**0083_MW114_4.5-5.0_230**	**Normal**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		462		1,460		598		11,300
	MW114	**27 Jun 2023**	**0083_QC110_230627**	**Field Duplicate**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		456		1,410		578		10,900
	MW114	**27 Jun 2023**	**0083_QC210_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
Powerhouse Pathway	**MW115**	**02 Mar 2018**	**0083_MW115_2.0-3.0_190**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				540		1,200		290		10,000
	MW115	**02 Mar 2018**	**0083_MW115_4-5-5.0_190**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				390		1,200		360		10,000
	MW115	**02 Mar 2018**	**0083_MW115_6.5-7.0_190**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				400		1,200		370		11,000
	MW115	**02 Mar 2018**	**0083_MW115_8.5-9.0_190**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				400		1,200		360		11,000
	MW115	**17 Jun 2018**	**0083_MW115_2.0-3.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					390		1,200		330		10,000
	MW115	**17 Jun 2018**	**0083_MW115_4.5-5.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					380		1,200		330		10,000
	MW115	**17 Jun 2018**	**0083_MW115_6.5-7.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					380		1,200		340		10,000
	MW115	**17 Jun 2018**	**0083_MW115_8.5-9.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.01	<0.002	<0.05					380		1,200		340		10,000
	MW115	**28 Nov 2019**	**0083_MW115_2.0-3.0_191**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		487		1,350		572		10,200
	MW115	**28 Nov 2019**	**0083_QC104_191128**	**Field Duplicate**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		486		1,380		584		10,500
	MW115	**28 Nov 2019**	**0083_QC204_191128**	**Interlab Duplicate**	**691456**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	410		1,200		340		8,800	
	MW115	**25 Jun 2020**	**0083_MW115_200625**	**Normal**	**EP2006594**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		452		1,360		511		10,500
	MW115	**18 Nov 2020**	**0083_MW115_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		452		1,380		512		10,700
	MW115	**22 Jun 2021**	**0083_MW115_8.5-9.0_210**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		472		1,460		623		11,000
	MW115	**23 Nov 2021**	**0083_MW115_2-3_211123**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		436		1,290		518		10,000
	MW115	**21 Jun 2022**	**0083_MW115_2-3_220621**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		375		1,080		479		8,410
	MW115	**24 Nov 2022**	**0083_MW115_2.5-3.0_221**	**Normal**	**EP2215871**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		249		715		291		5,740
	MW115	**27 Jun 2023**	**0083_MW115_2.0-3.0_230**	**Normal**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		433		1,370		550		10,600
Powerhouse Pathway	**MW116**	**03 Mar 2018**	**0083_MW116_1.2-2.2_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		11,000

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals								
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
	MW116	**03 Mar 2018**	**0083_MW116_4.5-5.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				420		1,300		380		11,000
	MW116	**03 Mar 2018**	**0083_MW116_6.5 -7.0_18(**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				420		1,300		380		11,000
	MW116	**03 Mar 2018**	**0083_MW116_8.5-9.0_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		380		11,000
	MW116	**17 Jun 2018**	**0083_MW116_1.2-2.2_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					330		1,100		310		9,100
	MW116	**17 Jun 2018**	**0083_MW116_4.5-5.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					400		1,300		370		11,000
	MW116	**17 Jun 2018**	**0083_MW116_6.5-7.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					430		1,300		390		12,000
	MW116	**17 Jun 2018**	**0083_MW116_8.5-9.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					390		1,200		360		11,000
	MW116	**28 Nov 2019**	**0083_MW116_4.5-5.0_191**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		489		1,500		657		11,500
	MW116	**25 Jun 2020**	**0083_MW116_200625**	**Normal**	**EP2006594**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		448		1,430		527		11,100
	MW116	**22 Jun 2021**	**0083_MW116_4.5-5.0_210**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		458		1,460		630		11,200
	MW116	**23 Nov 2021**	**0083_MW116_4.5-5.0_211**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		498		1,590		643		12,200
	MW116	**21 Jun 2022**	**0083_MW116_220621**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		473		1,490		646		11,000
	MW116	**23 Nov 2022**	**0083_MW116_1.2-2.2_221**	**Normal**	**EP2215818**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		382		1,210		492		9,480
	MW116	**27 Jun 2023**	**0083_MW116_4.5-5_2306:**	**Normal**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		414		1,300		548		9,980
Powerhouse Pathway	**MW117**	**03 Mar 2018**	**0083_MW117_2.0-2.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				430		1,300		390		11,000
	MW117	**03 Mar 2018**	**0083_MW117_4.0-4.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		11,000
	MW117	**03 Mar 2018**	**0083_MW117_6.0-6.5_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				440		1,300		370		11,000
	MW117	**03 Mar 2018**	**0083_MW117_7.4-7.9_180**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		380		11,000
	MW117	**17 Jun 2018**	**0083_MW117_2.0-2.5_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					400		1,200		360		11,000
	MW117	**17 Jun 2018**	**0083_MW117_4.0-4.5_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.004	<0.05					400		1,300		380		11,000
	MW117	**17 Jun 2018**	**0083_MW117_6.0-6.5_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					400		1,300		370		11,000
	MW117	**17 Jun 2018**	**0083_MW117_7.4-7.9_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					400		1,300		370		11,000
	MW117	**17 Jun 2018**	**0083_QC147_180617**	**Field Duplicate**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					420		1,300		390		12,000
	MW117	**17 Jun 2018**	**0083_QC247_180617**	**Interlab Duplicate**	**604955**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	470		1,300		430		11,000	
	MW117	**28 Nov 2019**	**0083_MW117_4.0-4.5_191**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		488		1,470		648		11,300
	MW117	**23 Jun 2020**	**0083_MW117_200623**	**Normal**	**EP2006520**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		468		1,490		541		12,200
	MW117	**17 Nov 2020**	**0083_MW117_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		510		1,590		682		12,400
	MW117	**22 Jun 2021**	**0083_MW117_6.0-6.5_210**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		493		1,560		686		12,000
	MW117	**23 Nov 2021**	**0083_MW117_4-4.5_2111**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		349		1,030		399		7,620
	MW117	**23 Nov 2021**	**0083_QC210_211123**	**Interlab Duplicate**	**844500**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
	MW117	**21 Jun 2022**	**0083_MW117_2-2.5_2206:**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		61		154		103		1,440
	MW117	**23 Nov 2022**	**0083_MW117_2.0-2.5_221**	**Normal**	**EP2215818**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		431		1,270		524		9,930
	MW117	**27 Jun 2023**	**0083_MW117_4.0-4.5_230**	**Normal**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		115		118		91		1,210
Pol Storage	**MW119**	**01 Mar 2018**	**0083_MW119_180301**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	**9.7**				190		460		150		4,000
	MW119	**01 Mar 2018**	**0083_QC117_180301**	**Field Duplicate**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	**10**										
	MW119	**01 Mar 2018**	**0083_QC217_180301**	**Interlab Duplicate**	**588874**	<0.05	<0.05	<0.05	<0.05	<0.05	**12.12**	17.82	19.29								
	MW119	**17 Jun 2018**	**0083_MW119_180617**	**Normal**	**212374**	<0.002	0.005	<0.02	<0.002	<0.05					190		490		140		4,500
	MW119	**28 Nov 2019**	**0083_MW119_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	**4.24**	7.20	7.84		243		641		277		4,800
	MW119	**25 Jun 2020**	**0083_MW119_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	**12.6**	21.0	22.7		184		499		237		3,970
	MW119	**17 Nov 2020**	**0083_MW119_201117**	**Normal**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	**8.12**	15.0	16.9		203		551		252		4,150
	MW119	**23 Jun 2021**	**0083_MW119_210623**	**Normal**	**EP2107188**	<0.02	<0.05	<0.05	<0.02	<0.05	**7.84**	13.6	15.0		214		604		265		4,620
	MW119	**23 Nov 2021**	**0083_MW119_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	**11.0**	20.1	21.8		209		602		244		4,420
	MW119	**23 Nov 2021**	**0083_QC113_211123**	**Field Duplicate**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	**7.83**	14.0	15.1								
	MW119	**23 Nov 2021**	**0083_QC213_211123**	**Interlab Duplicate**	**844500**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
	MW119	**21 Jun 2022**	**0083_MW119_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	**8.56**	14.7	15.9		192		485		228		3,440
	MW119	**24 Nov 2022**	**0083_MW119_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	**6.51**	10.8	11.7		211		519		219		3,840
	MW119	**27 Jun 2023**	**0083_MW119_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	**9.38**	15.2	16.4		193		478		213		3,510
Broader Area	**MW129**	**17 Jun 2018**	**0083_MW129_1.5-2.0_180**	**Normal**	**212374**	<0.004	<0.005	<0.02	<0.004	<0.05					470		880		250		8,700
	MW129	**17 Jun 2018**	**0083_MW129_5.5-6.0_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					260		600		200		5,500
	MW129	**17 Jun 2018**	**0083_MW129_9.5-10.0_18**	**Normal**	**212374**	<0.004	<0.01	<0.02	<0.004	<0.05					500		1,300		370		12,000
	MW129	**17 Jun 2018**	**0083_MW129_13.5-14.0_1**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					420		960		290		8,900
	MW129	**28 Nov 2019**	**0083_MW129_5.5-6.0_191**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	2.48	2.48		460		1,240		513		9,810
	MW129	**28 Nov 2019**	**0083_QC103_191128**	**Field Duplicate**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.93	0.93		446		1,180		489		9,370
	MW129	**28 Nov 2019**	**0083_QC203_191128**	**Interlab Duplicate**	**691456**	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	0.76	0.76	400		1,100		300		6,600	
	MW129	**23 Jun 2020**	**0083_MW129_200623**	**Normal**	**EP2006520**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.28	0.28		436		1,140		452		9,690
	MW129	**17 Nov 2020**	**0083_MW129_201117**	**Normal**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		468		1,270		513		9,690
	MW129	**17 Nov 2020**	**0083_QC102_201117**	**Field Duplicate**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		484		1,320		535		10,100
	MW129	**17 Nov 2020**	**0083_QC202_201117**	**Interlab Duplicate**	**758001**	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	<0.05	<0.1	410		1,100		310		9,300	
	MW129	**22 Jun 2021**	**0083_MW129_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.75	0.81	0.81		539		1,390		572		10,800
	MW129	**23 Nov 2021**	**0083_MW129_1.5-2_2111**	**Normal**	**EP2114300**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		540		1,390		513		10,800
	MW129	**21 Jun 2022**	**0083_MW129_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		547		1,520		618		11,000
	MW129	**23 Nov 2022**	**0083_MW129_1.5-2.0_221**	**Normal**	**EP2215820**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		502		1,360		536		10,800
	MW129	**27 Jun 2023**	**0083_MW129_1.5-2.0_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		499		1,410		532		10,700
Broader Area	**MW130**	**17 Jun 2018**	**0083_MW130_1.4-1.9_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					370		1,100		300		9,000
	MW130	**17 Jun 2018**	**0083_MW130_3.4-3.9_180**	**Normal**	**212374**	<0.02	<0.1	<0.1	<0.02	<0.5					500		1,100		300		10,000
	MW130	**17 Jun 2018**	**0083_MW130_5.4-5.9_180**	**Normal**	**212374**	<0.002	<0.02	<0.05	<0.002	<0.05					420		1,200		350		10,000
	MW130	**17 Jun 2018**	**0083_MW130_7.4-7.9_180**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					430		1,200		370		11,000
	MW130	**28 Nov 2019**	**0083_MW130_3.4-3.9_191**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.26	0.26		489		1,480		576		11,200
	MW130	**23 Jun 2020**	**0083_MW130_200623**	**Normal**	**EP2006455**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		456		1,340		499		10,700
	MW130	**17 Nov 2020**	**0083_MW130_201117**	**Normal**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		440		1,360		553		10,000
	MW130	**17 Nov 2020**	**0083_QC103_201117**	**Field Duplicate**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		431		1,330		538		9,810
	MW130	**17 Nov 2020**	**0083_QC203_201117**	**Interlab Duplicate**	**758001**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	350		1,100		330		9,100	
	MW130	**22 Jun 2021**	**0083_MW130_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		482		1,440		579		10,500
	MW130	**23 Nov 2021**	**0083_MW130_3.4-3.9_211**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		422		1,320		474		9,860
	MW130	**21 Jun 2022**	**0083_MW130_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		490		1,470		620		10,400
	MW130	**23 Nov 2022**	**0083_MW130_1.4-1.9_221**	**Normal**	**EP2215820**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		429		1,200		491		9,200
	MW130	**23 Nov 2022**	**0083_QC126_221123**	**Field Duplicate**	**EP2215820**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		424		1,180		485		9,100
	MW130	**23 Nov 2022**	**0083_QC226_221123**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
	MW130	**27 Jun 2023**	**0083_MW130_3.4-3.9_230**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		430		1,260		469		9,130
Broader Area	**MW134**	**23 Jun 2018**	**0083_MW134_180623**	**Normal**	**212781**	<0.004	<0.01	<0.02	<0.004	<0.05	0.008		0.020		430		940		330		9,200
	MW134	**28 Nov 2019**	**0083_MW134_191128**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.06	0.06		442		1,070		482		9,180
	MW134	**23 Jun 2020**	**0083_MW134_200623**	**Normal**	**EP2006455**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		424		988		498		8,860
	MW134	**17 Nov 2020**	**0083_MW134_201117**	**Normal**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		428		1,000		469		8,450
	MW134	**17 Nov 2020**	**0083_QC105_201117**	**Field Duplicate**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		432		1,010		471		8,490
	MW134	**17 Nov 2020**	**0083_QC205_201117**	**Interlab Duplicate**	**758001**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	470		1,000		350		7,200	

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals								
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
	MW134	**22 Jun 2021**	**0083_MW134_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		465		1,060		505		8,900
	MW134	**23 Nov 2021**	**0083_MW134_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		394		965		390		8,050
	MW134	**21 Jun 2022**	**0083_MW134_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		459		1,040		486		8,100
	MW134	**23 Nov 2022**	**0083_MW134_221123**	**Normal**	**EP2215820**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		441		981		448		8,470
	MW134	**27 Jun 2023**	**0083_MW134_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		447		1,060		445		8,670
POL Pathway	**MW202**	**03 Mar 2018**	**0083_AB20_180303**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				340		1,000		310		8,100
	MW202	**03 Mar 2018**	**0083_QC1212_180303**	**Field Duplicate**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				330		1,000		300		9,200
	MW202	**03 Mar 2018**	**0083_QC2212_180303**	**Interlab Duplicate**	**588874**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	330		1,100		310		11,000	
	MW202	**20 Jun 2018**	**0083_AB20_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				300		930		280		8,100
	MW202	**28 Nov 2019**	**0083_AB20_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		321		1,020		444		8,140
	MW202	**26 Jun 2020**	**0083_MW202_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		313		880		449		7,330
	MW202	**18 Nov 2020**	**0083_MW202_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		373		1,160		548		8,990
	MW202	**22 Jun 2021**	**0083_MW202_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04		461		1,490		641		11,300
	MW202	**23 Nov 2021**	**0083_MW202_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		309		988		400		7,890
	MW202	**21 Jun 2022**	**0083_MW202_220621**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		454		1,390		604		10,300
	MW202	**25 Nov 2022**	**0083_MW202_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		332		980		424		8,060
	MW202	**27 Jun 2023**	**0083_MW202_230627**	**Normal**	**EP2308611**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		291		764		258		7,060
	MW202	**07 Nov 2023**	**0083_MW202_231107**	**Normal**	**EP2315664**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		356		1,030		338		8,730
Pol Storage	**MW210**	**28 Feb 2018**	**0083_B02_180228**	**Normal**	**207612**	<0.002	<0.005	<0.01	<0.002	<0.05					240		590		180		5,000
	MW210	**13 Jun 2018**	**0083_B02_180613**	**Normal**	**212152**	<0.002	<0.005	<0.01	<0.002	<0.05	0.079				1,100		2,400		37		4,100
	MW210	**28 Nov 2019**	**0083_B02_191128**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.08	0.08		275		644		255		4,660
	MW210	**17 Mar 2020**	**B02_200317**	**Normal**	**EP2002947**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01								
	MW210	**26 Jun 2020**	**0083_MW210_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		250		543		236		4,180
	MW210	**17 Nov 2020**	**0083_MW210_201117**	**Normal**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		263		642		254		4,550
	MW210	**22 Jun 2021**	**0083_MW210_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		289		689		276		4,910
	MW210	**23 Nov 2021**	**0083_MW210_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		183		445		147		3,040
	MW210	**23 Nov 2021**	**0083_QC112_211123**	**Field Duplicate**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01								
	MW210	**23 Nov 2021**	**0083_QC212_211123**	**Interlab Duplicate**	**844500**	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	<0.05	<0.1								
	MW210	**21 Jun 2022**	**0083_MW210_220621**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.19	0.19		51		50		20		322
	MW210	**25 Nov 2022**	**0083_MW210_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	0.13	0.13		40		56		15		294
	MW210	**27 Jun 2023**	**0083_MW210_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	0.14	0.46	0.46		90		117		46		1,140
Pol Storage	**MW212**	**03 Mar 2018**	**0083_B04_180303**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				220		590		190		5,200
	MW212	**02 Jun 2018**	**0083_B04**	**Normal**	**211639**	<0.002	<0.005	<0.01	<0.002	<0.05	0.006				210		530		170		4,800
	MW212	**28 Nov 2019**	**0083_B04_191128**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.15	0.15		256		638		261		4,770
	MW212	**17 Mar 2020**	**B04_200317**	**Normal**	**EP2002947**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01								
	MW212	**17 Mar 2020**	**QC101_200317**	**Field Duplicate**	**EP2002947**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02								
	MW212	**17 Mar 2020**	**QC201_200317**	**Interlab Duplicate**	**709124**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
	MW212	**26 Jun 2020**	**0083_MW212_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		245		565		258		4,550
	MW212	**17 Nov 2020**	**0083_MW212_201117**	**Normal**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		290		808		330		6,000
	MW212	**17 Nov 2020**	**0083_QC104_201117**	**Field Duplicate**	**EP2012749**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		269		758		310		5,610
	MW212	**17 Nov 2020**	**0083_QC204_201117**	**Interlab Duplicate**	**758001**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	290		780		240		5,300	
	MW212	**22 Jun 2021**	**0083_MW212_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03		297		797		326		5,850
	MW212	**22 Jun 2021**	**0083_QC105_210622**	**Field Duplicate**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		319		891		361		6,510
	MW212	**22 Jun 2021**	**0083_QC205_210622**	**Interlab Duplicate**	**805492**	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.1	300		770		250		6,600	
	MW212	**23 Nov 2021**	**0083_MW212_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01		281		832		291		6,080
	MW212	**21 Jun 2022**	**0083_MW212_220621**	**Normal**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		385		1,080		431		7,660
	MW212	**21 Jun 2022**	**0083_QC111_220621**	**Field Duplicate**	**EP2207624**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02		306		803		312		5,510
	MW212	**21 Jun 2022**	**0083_QC211_220621**	**Interlab Duplicate**	**901207**	<0.004	<0.008	<0.004	<0.004	<0.008	0.041	0.076	0.079								
	MW212	**25 Nov 2022**	**0083_MW212_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06		63		119		70		1,070
	MW212	**27 Jun 2023**	**0083_MW212_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01		173		420		170		3,200
Powerhouse	**MW213**	**23 Feb 2018**	**0083_BDDBO5_180223**	**Normal**	**207359**	<0.002	<0.005	<0.01	<0.002	<0.05					130		110		35		720
	MW213	**16 Jun 2018**	**0083_BODB5_180616**	**Normal**	**212374**	<0.004	<0.02	<0.02	<0.004	<0.1					140		140		40		830
	MW213	**28 Nov 2019**	**0083_BDDBO5_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		102		84		35		428
	MW213	**23 Jun 2021**	**0083_MW213_210623**	**Normal**	**EP2107188**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		130		119		49		614
	MW213	**23 Nov 2021**	**0083_MW213_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		117		101		32		453
	MW213	**21 Jun 2022**	**0083_MW213_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.07	0.07		151		95		32		402
	MW213	**23 Nov 2022**	**0083_MW213_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03		97		63		20		257
	MW213	**27 Jun 2023**	**0083_MW213_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		86		38		12		105
	MW213	**27 Jun 2023**	**0083_QC112_230627**	**Field Duplicate**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		86		40		12		118
	MW213	**27 Jun 2023**	**0083_QC212_230627**	**Interlab Duplicate**	**1004390**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
Powerhouse	**MW214**	**27 Feb 2018**	**0083_B05_180227**	**Normal**	**207612**	<0.002	<0.005	<0.01	<0.002	<0.05					63		67		20		340
	MW214	**16 Jun 2018**	**0083_B05_180616**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					77		95		27		610
	MW214	**28 Nov 2019**	**0083_B05_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06		77		105		40		598
	MW214	**25 Jun 2020**	**0083_MW213_200625**	**Normal**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07	0.07		103		142		58		933
	MW214	**25 Jun 2020**	**0083_QC104_200625**	**Field Duplicate**	**EP2006683**	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08		98		126		51		819
	MW214	**25 Jun 2020**	**0083_QC204_200625**	**Interlab Duplicate**	**729352**	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.05	<0.1	110		150		45		1,100	
	MW214	**18 Nov 2020**	**0083_MW213_201118**	**Normal**	**EP2012904**	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03		90		108		42		647
	MW214	**22 Jun 2021**	**0083_MW214_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06								
	MW214	**23 Nov 2021**	**0083_MW214_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04		74		84		30		449
	MW214	**23 Nov 2021**	**0083_QC111_211123**	**Field Duplicate**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04								
	MW214	**23 Nov 2021**	**0083_QC211_211123**	**Interlab Duplicate**	**844500**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
	MW214	**21 Jun 2022**	**0083_MW214_220621**	**Normal**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.24	0.24	0.24		46		20		8		64
	MW214	**21 Jun 2022**	**0083_QC112_220621**	**Field Duplicate**	**EP2207630**	<0.02	<0.05	<0.05	<0.02	<0.05	0.25	0.25	0.25		47		21		8		66
	MW214	**21 Jun 2022**	**0083_QC212_220621**	**Interlab Duplicate**	**901207**	<0.004	<0.008	<0.004	<0.004	<0.008	0.19	0.26	0.26								
	MW214	**23 Nov 2022**	**0083_MW214_221123**	**Normal**	**EP2215793**	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08		32		28		9		113
	MW214	**23 Nov 2022**	**0083_QC127_221123**	**Field Duplicate**	**EP2215793**	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08		32		28		9		114
	MW214	**23 Nov 2022**	**0083_QC227_221123**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.12	0.12								
	MW214	**27 Jun 2023**	**0083_MW214_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08		23		19		7		76
Powerhouse Pathway	**MW217**	**02 Mar 2018**	**0083_B09_180302**	**Normal**	**207818**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				570		1,600		500		15,000
	MW217	**16 Jun 2018**	**0083_B09_180618**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					390		1,000		320		9,300
	MW217	**28 Nov 2019**	**0083_B09_191128**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		330		948		361		6,950
	MW217	**26 Jun 2020**	**0083_MW217_200626**	**Normal**	**EP2006690**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		306		952		382		7,350
	MW217	**18 Nov 2020**	**0083_MW217_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		342		918		417		7,190
	MW217	**22 Jun 2021**	**0083_MW217_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		415		1,190		532		9,310
	MW217	**23 Nov 2021**	**0083_MW217_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		331		908		361		7,230

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals							
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
	MW217	**21 Jun 2022**	**0083_MW217_220621**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		98		210		109		1,820
Powerhouse Pathway	**MW218**	**02 Mar 2018**	**0083_B10_180302**	**Normal**	**207818**	<0.002	0.005	<0.01	<0.002	<0.05	<0.001				190		550		170		4,800
	MW218	**16 Jun 2018**	**0083_B10_180618**	**Normal**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					190		460		130		4,000
	MW218	**18 Jun 2018**	**0083_QC157_180618**	**Field Duplicate**	**212374**	<0.002	<0.005	<0.02	<0.002	<0.05					180		410		120		3,600
	MW218	**18 Jun 2018**	**0083_QC257_180618**	**Interlab Duplicate**	**604955**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	200		400		130		3,400	
	MW218	**28 Nov 2019**	**0083_B10_191128**	**Normal**	**EP1912604**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		184		496		180		3,810
	MW218	**26 Jun 2020**	**0083_MW218_200626**	**Normal**	**EP2006690**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		173		400		154		3,170
	MW218	**17 Nov 2020**	**0083_MW218_201117**	**Normal**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		237		614		249		4,420
	MW218	**22 Jun 2021**	**0083_MW218_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		245		575		244		4,250
	MW218	**23 Nov 2021**	**0083_MW218_211123**	**Normal**	**EP2114296**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		218		574		211		4,200
	MW218	**21 Jun 2022**	**0083_MW218_220621**	**Normal**	**EP2207626**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		141		272		122		2,240
	MW218	**24 Nov 2022**	**0083_MW218_221124**	**Normal**	**EP2215848**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		25		45		31		364
	MW218	**27 Jun 2023**	**0083_MW218_230627**	**Normal**	**EP2308621**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		59		103		67		903
	OTH002	**27 Feb 2018**	**0083_OTH002_180227**	**Normal**	**207612**	<0.002	<0.005	<0.01	<0.002	<0.05					610		1,700		540		15,000
	OTH002	**06 Jun 2018**	**0083_OTH002_180606**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				600		1,700		540		15,000
	OTH002	**12 Jun 2018**	**0082_QC246_180612**	**Interlab Duplicate**	**604214**	<0.05	<0.05	<0.05	<0.05	<0.05	0.25	0.28	1	9.3		0.9		<0.5		11	
	OTH002	**27 Jun 2020**	**0083_OTH002_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		484		1,500		630		11,600
	OTH002	**17 Nov 2020**	**0083_OTH002_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		496		1,550		663		11,900
	OTH002	**22 Jun 2021**	**0083_OTH002_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		475		1,520		655		11,700
	OTH002	**22 Jun 2021**	**0083_QC103_210622**	**Field Duplicate**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		488		1,540		665		11,800
	OTH002	**22 Jun 2021**	**0083_QC203_210622**	**Interlab Duplicate**	**805492**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	540		1,500		500		10,000	
	OTH002	**23 Nov 2021**	**0083_OTH002_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		409		1,400		529		10,900
	OTH101	**12 Feb 2018**	**0083_OTH101_180212**	**Normal**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					400		1,300		380		11,000
	OTH101	**20 Jun 2018**	**0083_OTH101_A_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				380		1,300		380		11,000
	OTH101	**20 Jun 2018**	**0083_OTH101_B_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				390		1,300		400		12,000
	OTH101	**28 Nov 2019**	**0083_OTH101_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		476		1,460		631		11,100
	OTH101	**28 Jun 2020**	**0083_OTH101_200628**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		476		1,470		620		11,400
	OTH101	**18 Nov 2020**	**0083_OTH101_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		467		1,490		546		11,500
	OTH101	**22 Jun 2021**	**0083_OTH101_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		494		1,560		674		11,900
	OTH101	**24 Nov 2021**	**0083_OTH101_211124**	**Normal**	**EP2114391**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		436		1,370		547		10,600
	OTH101	**21 Jun 2022**	**0083_OTH101_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		497		1,560		663		11,600
	OTH101	**24 Nov 2022**	**0083_OTH101_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		434		1,390		570		11,000
	OTH101	**27 Jun 2023**	**0083_OTH101_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		454		1,460		594		11,300
	OTH102	**12 Feb 2018**	**0083_OTH102_180212**	**Normal**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					400		1,300		370		11,000
	OTH102	**20 Jun 2018**	**0083_OTH102_A_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				410		1,300		420		12,000
	OTH102	**20 Jun 2018**	**0083_OTH102_B_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				420		1,400		430		13,000
	OTH102	**28 Nov 2019**	**0083_OTH102_191128**	**Normal**	**EP1912603**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		481		1,640		670		12,600
	OTH102	**28 Jun 2020**	**0083_OTH102_200628**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		476		1,470		623		11,400
	OTH102	**18 Nov 2020**	**0083_OTH102_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		455		1,460		539		11,300
	OTH102	**22 Jun 2021**	**0083_OTH102_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		492		1,570		676		12,100
	OTH102	**23 Nov 2021**	**0083_OTH102_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		399		1,370		512		10,700
	OTH102	**21 Jun 2022**	**0083_OTH102_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		514		1,610		687		12,000
	OTH102	**25 Nov 2022**	**0083_OTH102_221125**	**Normal**	**EP2215921**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		447		1,350		558		10,900
	OTH102	**27 Jun 2023**	**0083_OTH102_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		453		1,460		595		11,300
	OTH103	**12 Feb 2018**	**0083_OTH103_180212**	**Normal**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					410		1,300		390		12,000
	OTH103	**09 Jun 2018**	**0083_OTH103_A_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				420		1,300		400		12,000
	OTH103	**09 Jun 2018**	**0083_OTH103_B_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		12,000
	OTH103	**30 Nov 2019**	**0083_OTH103_191130**	**Normal**	**EP1912684**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		484		1,660		685		12,700
	OTH103	**27 Jun 2020**	**0083_OTH103_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		492		1,510		640		11,800
	OTH103	**17 Nov 2020**	**0083_OTH103_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		464		1,450		616		11,200
	OTH103	**22 Jun 2021**	**0083_oth103_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		474		1,490		641		11,400
	OTH103	**23 Nov 2021**	**0083_OTH103_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		418		1,430		536		11,000
	OTH103	**21 Jun 2022**	**0083_OTH103_220621**	**Normal**	**EP2207634**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		418		1,330		542		9,870
	OTH103	**25 Nov 2022**	**0083_OTH103_221125**	**Normal**	**EP2215920**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		442		1,380		570		10,900
	OTH103	**27 Jun 2023**	**0083_OTH103_230627**	**Normal**	**EP2308616**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		407		1,150		367		10,200
	OTH104	**12 Feb 2018**	**0083_OTH104_180212**	**Normal**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					400		1,300		370		11,000
	OTH104	**09 Jun 2018**	**0083_OTH104_A_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		11,000
	OTH104	**09 Jun 2018**	**0083_OTH104_B_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				420		1,300		400		12,000
	OTH104	**28 Nov 2019**	**0083_OTH104_191128**	**Normal**	**EP1912605**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		472		1,600		647		12,300
	OTH104	**27 Jun 2020**	**0083_OTH104_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		492		1,500		638		11,700
	OTH104	**18 Nov 2020**	**0083_OTH104_201118**	**Normal**	**EP2012904**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		462		1,490		550		11,600
	OTH104	**22 Jun 2021**	**0083_OTH104_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		474		1,500		647		11,500
	OTH104	**23 Nov 2021**	**0083_OTH104_211123**	**Normal**	**EP2114295**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		407		1,400		523		10,800
	OTH104	**21 Jun 2022**	**0083_OTH104_220621**	**Normal**	**EP2207634**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		409		1,320		536		9,680
	OTH104	**24 Nov 2022**	**0083_OTH104_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		479		1,500		619		11,800
	OTH104	**27 Jun 2023**	**0083_OTH104_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		451		1,490		585		11,300
	OTH105	**21 Feb 2018**	**0083_OTH105_180221**	**Normal**	**207287**	<0.002	<0.005	<0.01	<0.002	<0.05											
	OTH105	**09 Jun 2018**	**0083_OTH105_A_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				400		1,300		380		11,000
	OTH105	**09 Jun 2018**	**0083_OTH105_B_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		12,000
	OTH105	**28 Nov 2019**	**0083_OTH105_191128**	**Normal**	**EP1912605**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		494		1,690		696		13,000
	OTH105	**27 Jun 2020**	**0083_OTH105_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		465		1,430		600		11,100
	OTH105	**17 Nov 2020**	**0083_OTH105_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		496		1,540		649		11,900
	OTH105	**22 Jun 2021**	**0083_OTH105_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		462		1,490		531		11,900
	OTH105	**23 Nov 2021**	**0083_OTH105_211123**	**Normal**	**EP2114301**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		442		1,390		549		10,700
	OTH105	**21 Jun 2022**	**0083_OTH105_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		511		1,610		688		12,000
	OTH105	**24 Nov 2022**	**0083_OTH105_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		498		1,590		656		12,700
	OTH105	**24 Nov 2022**	**0083_QC129_221124**	**Field Duplicate**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		455		1,450		597		11,600
	OTH105	**24 Nov 2022**	**0083_QC229_221124**	**Interlab Duplicate**	**945147**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1								
	OTH105	**27 Jun 2023**	**0083_OTH105_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		459		1,450		589		11,200
	OTH106	**21 Feb 2018**	**0083_OTH106_180221**	**Normal**	**207287**	<0.002	<0.005	<0.01	<0.002	<0.05											
	OTH106	**09 Jun 2018**	**0083_OTH106_A_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				410		1,300		390		11,000
	OTH106	**09 Jun 2018**	**0083_OTH106_B_180609**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	0.002				400		1,200		380		11,000
	OTH106	**28 Nov 2019**	**0083_OTH106_191128**	**Normal**	**EP1912605**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		494		1,510		652		11,600
	OTH106	**27 Jun 2020**	**0083_OTH106_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		498		1,530		651		11,800
	OTH106	**17 Nov 2020**	**0083_OTH106_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		496		1,540		652		11,900

Table 4 - Groundwater and Seepage water Analytical Results

						PFAS - Perfluoroalkyl Sulfonamides					PFAS			Metals								
						N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)
						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
LOR - Limit of Reporting						0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water											**2**										
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																
	OTH106	**22 Jun 2021**	**0083_OTH106_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		468		1,500		647		11,500
	OTH106	**23 Nov 2021**	**0083_OTH106_211123**	**Normal**	**EP2114301**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		424		1,340		528		10,300
	OTH106	**21 Jun 2022**	**0083_OTH106_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		519		1,640		704		12,200
	OTH106	**24 Nov 2022**	**0083_OTH106_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		477		1,550		632		12,500
	OTH106	**27 Jun 2023**	**0083_OTH106_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		467		1,450		590		11,300
	OTH107	**12 Feb 2018**	**0083_OTH107_180212**	**Normal**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					410		1,300		380		12,000
	OTH107	**23 Jun 2018**	**0083_OTH107_A_180623**	**Normal**	**212781**	<0.004	<0.01	<0.02	<0.004	<0.05	<0.001		<0.001		400		1,300		390		11,000
	OTH107	**23 Jun 2018**	**0083_OTH107_B_180623**	**Normal**	**212781**	<0.004	<0.01	<0.02	<0.004	<0.05	<0.001		<0.001		450		1,500		450		13,000
	OTH107	**23 Jun 2018**	**0083_QC778_180623**	**Interlab Duplicate**	**605978**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	470		1,500		460		12,000	
	OTH107	**28 Nov 2019**	**0083_OTH107_191128**	**Normal**	**EP1912605**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		511		1,570		682		12,100
	OTH107	**27 Jun 2020**	**0083_OTH107_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		511		1,560		662		12,100
	OTH107	**17 Nov 2020**	**0083_OTH107_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		495		1,530		652		11,800
	OTH107	**22 Jun 2021**	**0083_OTH107_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		492		1,550		670		11,900
	OTH107	**23 Nov 2021**	**0083_OTH107_211123**	**Normal**	**EP2114301**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		460		1,450		580		11,200
	OTH107	**21 Jun 2022**	**0083_OTH107_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		438		1,400		577		10,400
	OTH107	**23 Nov 2022**	**0083_OTH107_221123**	**Normal**	**EP2215819**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		449		1,390		586		10,800
	OTH107	**27 Jun 2023**	**0083_OTH107_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		468		1,500		615		11,700
	OTH108	**12 Feb 2018**	**0083_OTH108_180212**	**Normal**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					390		1,200		360		11,000
	OTH108	**12 Feb 2018**	**0083_QC1201_180212**	**Field Duplicate**	**206780**	<0.002	<0.005	<0.01	<0.002	<0.05					400		1,300		370		11,000
	OTH108	**10 Jun 2018**	**0083_OTH108_A_180610**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				430		1,300		410		12,000
	OTH108	**10 Jun 2018**	**0083_OTH108_B_180610**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				430		1,400		420		12,000
	OTH108	**28 Nov 2019**	**0083_OTH108_191128**	**Normal**	**EP1912605**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		479		1,640		667		12,700
	OTH108	**27 Jun 2020**	**0083_OTH108_200627**	**Normal**	**EP2006692**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		495		1,510		639		11,700
	OTH108	**17 Nov 2020**	**0083_OTH108_201117**	**Normal**	**EP2012742**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		479		1,480		634		11,500
	OTH108	**22 Jun 2021**	**0083_OTH108_210622**	**Normal**	**EP2107095**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		491		1,560		676		12,000
	OTH108	**23 Nov 2021**	**0083_OTH108_211123**	**Normal**	**EP2114301**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		455		1,430		569		11,000
	OTH108	**21 Jun 2022**	**0083_OTH108_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		527		1,650		710		12,300
	OTH108	**23 Nov 2022**	**0083_OTH108_221123**	**Normal**	**EP2215819**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		465		1,440		608		11,200
	OTH108	**27 Jun 2023**	**0083_OTH108_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		466		1,480		601		11,500
	OTH109	**20 Jun 2018**	**0083_OTH109_A_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				420		1,400		430		13,000
	OTH109	**20 Jun 2018**	**0083_OTH109_B_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	<0.001				410		1,300		410		12,000
	OTH109	**28 Nov 2019**	**0083_OTH109_191128**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		414		1,340		504		10,400
	OTH109	**26 Jun 2020**	**0083_OTH109_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		490		1,490		551		11,500
	OTH109	**18 Nov 2020**	**0083_OTH109_201118**	**Normal**	**EP2012854**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		452		1,450		536		11,200
	OTH109	**22 Jun 2021**	**0083_OTH109_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		452		1,440		613		11,000
	OTH109	**24 Nov 2021**	**0083_OTH109_211124**	**Normal**	**EP2114391**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		436		1,380		546		10,600
	OTH109	**21 Jun 2022**	**0083_OTH109_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		520		1,640		704		12,200
	OTH109	**24 Nov 2022**	**0083_OTH109_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		443		1,380		563		11,000
	OTH109	**27 Jun 2023**	**0083_OTH109_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		446		1,460		598		11,300
	OTH110	**20 Jun 2018**	**0083_OTH110_A_180620**	**Normal**	**212571**	<0.002	<0.005	<0.02	<0.002	<0.05	0.003				390		1,300		390		12,000
	OTH110	**20 Jun 2018**	**0083_OTH110_B_180620**	**Normal**	**212571**	<0.002	0.009	<0.02	<0.002	<0.05	<0.001				380		1,300		390		11,000
	OTH110	**28 Nov 2019**	**0083_OTH110_191128**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		492		1,670		674		12,900
	OTH110	**26 Jun 2020**	**0083_OTH110_200626**	**Normal**	**EP2006686**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		492		1,480		551		11,600
	OTH110	**18 Nov 2020**	**0083_OTH110_201118**	**Normal**	**EP2012904**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		452		1,450		537		11,300
	OTH110	**22 Jun 2021**	**0083_OTH110_210622**	**Normal**	**EP2107185**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		462		1,460		622		11,200
	OTH110	**24 Nov 2021**	**0083_OTH110_211124**	**Normal**	**EP2114391**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		418		1,320		523		10,200
	OTH110	**21 Jun 2022**	**0083_OTH110_220621**	**Normal**	**EP2207627**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		504		1,590		680		11,800
	OTH110	**24 Nov 2022**	**0083_OTH110_221124**	**Normal**	**EP2215870**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		489		1,560		648		12,500
	OTH110	**27 Jun 2023**	**0083_OTH110_230627**	**Normal**	**EP2308612**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		445		1,430		584		11,100
	OTH113	**10 Jun 2018**	**0082_QC257_180610**	**Interlab Duplicate**	**604115**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	470		1,400		460		13,000	
	OTH113	**10 Jun 2018**	**0083_OTH113_A_180610**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	0.005				380		1,200		370		11,000
	OTH113	**10 Jun 2018**	**0083_OTH113_B_180610**	**Normal**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				450		1,400		430		13,000
	OTH113	**10 Jun 2018**	**0083_QC157_180310**	**Field Duplicate**	**212095**	<0.002	<0.005	<0.01	<0.002	<0.05	0.004				480		1,500		460		13,000
	OTH113	**28 Nov 2019**	**0083_OTH113_191128**	**Normal**	**EP1912600**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		466		1,580		630		12,000
	OTH113	**28 Jun 2020**	**0083_OTH113_200628**	**Normal**	**EP2006748**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		476		1,470		619		11,400
	OTH113	**17 Nov 2020**	**0083_OTH113_201117**	**Normal**	**EP2012743**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		457		1,480		631		11,400
	OTH113	**22 Jun 2021**	**0083_OTH113_210622**	**Normal**	**EP2107184**	<0.02	<0.05	<0.05	<0.02	<0.05	0.56	0.58	0.58		480		1,540		665		11,800
	OTH113	**16 May 2022**	**0083_OTH113_220516**	**Normal**	**EP2205863**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01								
	OTH113	**21 Jun 2022**	**0083_OTH113_220621**	**Normal**	**EP2207632**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		455		1,520		593		11,000
	OTH113	**23 Nov 2022**	**0083_OTH113_221123**	**Normal**	**EP2215816**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		450		1,390		582		11,100
	OTH113	**27 Jun 2023**	**0083_OTH113_230627**	**Normal**	**EP2308617**	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		446		1,470		573		11,100

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

First Time Detect of PFOA or PFHxS+PFOS

New Exceedance of Guideline Value

Table 5 - Surface Water Analytical Results

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorote
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PFAS NEMP 2020 Interim Marine 99%									0.00023						19								
PFAS NEMP 2020 Recreational Water															**10**								
Monitoring Area	**Location Code**	**Date**	**Sample Type**	**Lab Report Number**																			
	SW113	01 Mar 2018	Normal	207818	<0.05	<0.05	1.3	<0.05	1.1	<0.1	1.6	5.5	4.8	2.5	0.86	0.2	<0.1	<0.1	<0.2	<0.5	<2.5	<0.05	33
	SW113	04 Jun 2018	Field Duplicate	211639	0.051	0.041	0.40	0.038	0.82	<0.002	0.26	1.9	1.5	0.96	0.28	0.13	<0.002	<0.002	<0.005	<0.01	<0.05	0.006	8.3
	SW113	04 Jun 2018	Interlab Duplicate	602341	<0.01	0.02	0.43	<0.01	0.96	<0.01	0.34	1.6	1.2	0.74	0.26	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.9
	SW113	04 Jun 2018	Normal	211639	0.041	0.040	0.50	0.040	0.81	<0.002	0.56	2.1	1.6	1.1	0.31	0.23	<0.02	<0.002	<0.005	<0.01	<0.05	<0.001	10
	SW113	26 May 2020	Normal	EP2005405	0.25	<0.02	0.31	<0.02	0.34	<0.02	<0.1	1.81	1.14	0.70	0.22	0.07	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.90
	SW113	05 Mar 2021	Normal	EP2102350	<0.02	<0.02	0.14	<0.02	0.21	<0.02	<0.1	0.95	0.54	0.35	0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.98
	SW113	23 Jun 2021	Normal	EP2107191	<0.02	<0.02	0.03	<0.02	0.10	<0.02	<0.1	0.36	0.25	0.16	0.07	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.84
	SW113	23 Nov 2021	Field Duplicate	EP2114297	<0.02	<0.02	0.32	<0.02	0.53	<0.02	<0.1	0.89	0.94	0.40	0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.53
	SW113	23 Nov 2021	Interlab Duplicate	844500	0.02	0.01	0.32	0.01	0.45	<0.01	0.33	0.94	0.44	0.39	0.13	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
	SW113	23 Nov 2021	Normal	EP2114297	<0.02	<0.02	0.30	<0.02	0.54	<0.02	<0.1	0.87	0.96	0.39	0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.58
	SW113	16 May 2022	Field Duplicate	EP2205864	<0.02	<0.02	0.08	<0.02	0.22	<0.02	0.1	0.39	0.25	0.17	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.70
	SW113	16 May 2022	Interlab Duplicate	890774	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	0.30	0.17	<0.1	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	0.5
	SW113	16 May 2022	Normal	EP2205864	<0.02	<0.02	0.08	<0.02	0.22	<0.02	0.1	0.41	0.24	0.17	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.72
	SW113	21 Jun 2022	Field Duplicate	EP2207632	<0.02	<0.02	0.04	<0.02	0.10	<0.02	<0.1	0.35	0.20	0.13	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.53
	SW113	21 Jun 2022	Interlab Duplicate	901207	<0.002	<0.002	0.058	<0.002	0.043	<0.004	0.12	0.006	0.12	0.057	0.072	0.024	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	0.39
	SW113	21 Jun 2022	Normal	EP2207632	<0.02	<0.02	0.05	<0.02	0.12	<0.02	<0.1	0.37	0.19	0.13	0.04	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.54
	SW113	27 Jun 2023	Normal	EP2308623	<0.02	<0.02	0.49	<0.02	0.68	<0.02	0.5	4.84	1.77	0.90	0.26	0.10	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.77
	SW120	08 Jun 2018	Interlab Duplicate	604115	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
	SW120	08 Jun 2018	Field Duplicate	212095	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001
	SW120	08 Jun 2018	Normal	212095	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001
	SW120	27 May 2020	Normal	EP2005486	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW120	03 Mar 2021	Normal	EP2102201	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW120	22 Jun 2021	Normal	EP2107186	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW120	16 May 2022	Normal	EP2205864	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW120	21 Jun 2022	Normal	EP2207632	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW126	08 Jun 2018	Normal	212095	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001
	SW126	21 Jun 2022	Normal	EP2207634	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW127	06 Jun 2018	Normal	212095	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001
	SW127	26 May 2020	Normal	EP2005405	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW127	03 Mar 2021	Field Duplicate	EP2102194	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW127	03 Mar 2021	Interlab Duplicate	779429	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
	SW127	03 Mar 2021	Normal	EP2102194	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW127	22 Jun 2021	Normal	EP2107094	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW127	16 May 2022	Normal	EP2205864	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW127	21 Jun 2022	Normal	EP2207634	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	04 Jun 2018	Normal	211639	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.053	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001
	SW128	27 May 2020	Field Duplicate	EP2005486	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	27 May 2020	Interlab Duplicate	723348	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
	SW128	27 May 2020	Normal	EP2005486	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	03 Mar 2021	Normal	EP2102201	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	22 Jun 2021	Field Duplicate	EP2107094	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	22 Jun 2021	Interlab Duplicate	805492	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
	SW128	22 Jun 2021	Normal	EP2107094	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	23 Nov 2021	Normal	EP2114297	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	16 May 2022	Normal	EP2205864	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	21 Jun 2022	Normal	EP2207634	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	27 Jun 2023	Field Duplicate	EP2308616	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
	SW128	27 Jun 2023	Interlab Duplicate	1004390	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
	SW128	27 Jun 2023	Normal	EP2308616	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water
First Time Detect of PFOA or PFHxS+PFOS
New Exceedance of Guideline Value

Table 5 - Surface Water Analytical Results

					Fluorotelomer Sulfonic Acids		PFAS - Perfluoroalkyl Sulfonamides							PFAS			Metals						
					8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium
					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
LOR - Limit of Reporting					0.001	0.001	0.004	0.004	0.002	0.005	0.004	0.002	0.008	0.001	0.001	0.001	0.5	0.5	0.5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Interim Marine 99%																							
PFAS NEMP 2020 Recreational Water														**2**									
Monitoring Area	**Location Code**	**Date**	**Sample Type**	**Lab Report Number**																			
	SW113	**01 Mar 2018**	**Normal**	**207818**	3.3	<0.05	<0.5	<0.2	<0.1	<0.2	<0.5	<0.1	<2.5	**2.4**				490		54		27	
	SW113	**04 Jun 2018**	**Field Duplicate**	**211639**	0.78	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	1.2			120			13		6.8	
	SW113	**04 Jun 2018**	**Interlab Duplicate**	**602341**	0.81	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.39	13.24	13.43			12		6.4		130
	SW113	**04 Jun 2018**	**Normal**	**211639**	0.66	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	1.3				120		13		7.0	
	SW113	**26 May 2020**	**Normal**	**EP2005405**	0.72	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.65	9.39	9.46		157		18		11	
	SW113	**05 Mar 2021**	**Normal**	**EP2102350**	0.43	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.35	4.72	4.77		48		6		5	
	SW113	**23 Jun 2021**	**Normal**	**EP2107191**	0.15	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.13	1.96	1.98		44		5		3	
	SW113	**23 Nov 2021**	**Field Duplicate**	**EP2114297**	0.55	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.85	5.28	5.33							
	SW113	**23 Nov 2021**	**Interlab Duplicate**	**844500**	0.97	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.77	5.69	5.77							
	SW113	**23 Nov 2021**	**Normal**	**EP2114297**	0.56	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.84	5.32	5.37		142		15		6	
	SW113	**16 May 2022**	**Field Duplicate**	**EP2205864**	0.26	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.30	2.23	2.27		27		2		2	
	SW113	**16 May 2022**	**Interlab Duplicate**	**890774**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	1.0	1.0							
	SW113	**16 May 2022**	**Normal**	**EP2205864**	0.31	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.30	2.31	2.35		28		3		2	
	SW113	**21 Jun 2022**	**Field Duplicate**	**EP2207632**	0.09	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.14	1.48	1.50		25		3		2	
	SW113	**21 Jun 2022**	**Interlab Duplicate**	**901207**	0.043	<0.004	<0.004	<0.004	<0.004	<0.008	<0.004	<0.004	<0.008	0.10	0.91	0.93							
	SW113	**21 Jun 2022**	**Normal**	**EP2207632**	0.09	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.17	1.53	1.56		25		3		2	
	SW113	**27 Jun 2023**	**Normal**	**EP2308623**	0.42	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.17	10.6	10.7		115		10		7	
	SW120	**08 Jun 2018**	**Interlab Duplicate**	**604115**	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	290		190		74		1,700
	SW120	**08 Jun 2018**	**Field Duplicate**	**212095**	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				280		190		71	
	SW120	**08 Jun 2018**	**Normal**	**212095**	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.002				270		180		66	
	SW120	**27 May 2020**	**Normal**	**EP2005486**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		1,190		2,120		891	
	SW120	**03 Mar 2021**	**Normal**	**EP2102201**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		421		345		182	
	SW120	**22 Jun 2021**	**Normal**	**EP2107186**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		965		551		247	
	SW120	**16 May 2022**	**Normal**	**EP2205864**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		490		374		162	
	SW120	**21 Jun 2022**	**Normal**	**EP2207632**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		764		599		220	
	SW126	**08 Jun 2018**	**Normal**	**212095**	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.003				360		99		43	
	SW126	**21 Jun 2022**	**Normal**	**EP2207634**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		475		146		64	
	SW127	**06 Jun 2018**	**Normal**	**212095**	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.002				220		80		33	
	SW127	**26 May 2020**	**Normal**	**EP2005405**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		1,190		889		512	
	SW127	**03 Mar 2021**	**Field Duplicate**	**EP2102194**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		569		223		132	
	SW127	**03 Mar 2021**	**Interlab Duplicate**	**779429**	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	510		210		96		2,500
	SW127	**03 Mar 2021**	**Normal**	**EP2102194**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		558		220		129	
	SW127	**22 Jun 2021**	**Normal**	**EP2107094**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		882		459		188	
	SW127	**16 May 2022**	**Normal**	**EP2205864**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		474		152		72	
	SW127	**21 Jun 2022**	**Normal**	**EP2207634**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		706		406		158	
	SW128	**04 Jun 2018**	**Normal**	**211639**	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	<0.001				1,500		4,500		1,300	
	SW128	**27 May 2020**	**Field Duplicate**	**EP2005486**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		1,120		1,500		609	
	SW128	**27 May 2020**	**Interlab Duplicate**	**723348**	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	830		1,000		340		12,000
	SW128	**27 May 2020**	**Normal**	**EP2005486**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		1,120		1,490		613	
	SW128	**03 Mar 2021**	**Normal**	**EP2102201**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		494		380		145	
	SW128	**22 Jun 2021**	**Field Duplicate**	**EP2107094**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		600		310		118	
	SW128	**22 Jun 2021**	**Interlab Duplicate**	**805492**	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	570		310		92		2,200
	SW128	**22 Jun 2021**	**Normal**	**EP2107094**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		589		305		118	
	SW128	**23 Nov 2021**	**Normal**	**EP2114297**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		422		14,200		4,970	
	SW128	**16 May 2022**	**Normal**	**EP2205864**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		409		279		105	
	SW128	**21 Jun 2022**	**Normal**	**EP2207634**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		590		566		220	
	SW128	**27 Jun 2023**	**Field Duplicate**	**EP2308616**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01							
	SW128	**27 Jun 2023**	**Interlab Duplicate**	**1004390**	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.06	<0.1							
	SW128	**27 Jun 2023**	**Normal**	**EP2308616**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01		979		6,590		1,920	

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water
First Time Detect of PFOA or PFHxS+PFOS
New Exceedance of Guideline Value

					Sodium (filtered)
					mg/L
LOR - Limit of Reporting					0.5
PFAS NEMP 2020 Interim Marine 99%					
PFAS NEMP 2020 Recreational Water					
Monitoring Area	**Location Code**	**Date**	**Sample Type**	**Lab Report Number**	
	SW113	**01 Mar 2018**	**Normal**	**207818**	580
	SW113	**04 Jun 2018**	**Field Duplicate**	**211639**	120
	SW113	**04 Jun 2018**	**Interlab Duplicate**	**602341**	
	SW113	**04 Jun 2018**	**Normal**	**211639**	120
	SW113	**26 May 2020**	**Normal**	**EP2005405**	171
	SW113	**05 Mar 2021**	**Normal**	**EP2102350**	76
	SW113	**23 Jun 2021**	**Normal**	**EP2107191**	53
	SW113	**23 Nov 2021**	**Field Duplicate**	**EP2114297**	
	SW113	**23 Nov 2021**	**Interlab Duplicate**	**844500**	
	SW113	**23 Nov 2021**	**Normal**	**EP2114297**	93
	SW113	**16 May 2022**	**Field Duplicate**	**EP2205864**	29
	SW113	**16 May 2022**	**Interlab Duplicate**	**890774**	
	SW113	**16 May 2022**	**Normal**	**EP2205864**	31
	SW113	**21 Jun 2022**	**Field Duplicate**	**EP2207632**	31
	SW113	**21 Jun 2022**	**Interlab Duplicate**	**901207**	
	SW113	**21 Jun 2022**	**Normal**	**EP2207632**	31
	SW113	**27 Jun 2023**	**Normal**	**EP2308623**	97
	SW120	**08 Jun 2018**	**Interlab Duplicate**	**604115**	
	SW120	**08 Jun 2018**	**Field Duplicate**	**212095**	1,600
	SW120	**08 Jun 2018**	**Normal**	**212095**	1,700
	SW120	**27 May 2020**	**Normal**	**EP2005486**	17,200
	SW120	**03 Mar 2021**	**Normal**	**EP2102201**	3,170
	SW120	**22 Jun 2021**	**Normal**	**EP2107186**	4,470
	SW120	**16 May 2022**	**Normal**	**EP2205864**	3,120
	SW120	**21 Jun 2022**	**Normal**	**EP2207632**	4,080
	SW126	**08 Jun 2018**	**Normal**	**212095**	980
	SW126	**21 Jun 2022**	**Normal**	**EP2207634**	985
	SW127	**06 Jun 2018**	**Normal**	**212095**	630
	SW127	**26 May 2020**	**Normal**	**EP2005405**	10,000
	SW127	**03 Mar 2021**	**Field Duplicate**	**EP2102194**	2,400
	SW127	**03 Mar 2021**	**Interlab Duplicate**	**779429**	
	SW127	**03 Mar 2021**	**Normal**	**EP2102194**	2,340
	SW127	**22 Jun 2021**	**Normal**	**EP2107094**	3,250
	SW127	**16 May 2022**	**Normal**	**EP2205864**	1,040
	SW127	**21 Jun 2022**	**Normal**	**EP2207634**	3,050
	SW128	**04 Jun 2018**	**Normal**	**211639**	51,000
	SW128	**27 May 2020**	**Field Duplicate**	**EP2005486**	13,800
	SW128	**27 May 2020**	**Interlab Duplicate**	**723348**	
	SW128	**27 May 2020**	**Normal**	**EP2005486**	13,900
	SW128	**03 Mar 2021**	**Normal**	**EP2102201**	3,020
	SW128	**22 Jun 2021**	**Field Duplicate**	**EP2107094**	2,130
	SW128	**22 Jun 2021**	**Interlab Duplicate**	**805492**	
	SW128	**22 Jun 2021**	**Normal**	**EP2107094**	2,080
	SW128	**23 Nov 2021**	**Normal**	**EP2114297**	96,400
	SW128	**16 May 2022**	**Normal**	**EP2205864**	2,040
	SW128	**21 Jun 2022**	**Normal**	**EP2207634**	3,760
	SW128	**27 Jun 2023**	**Field Duplicate**	**EP2308616**	
	SW128	**27 Jun 2023**	**Interlab Duplicate**	**1004390**	
	SW128	**27 Jun 2023**	**Normal**	**EP2308616**	75,600

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water
First Time Detect of PFOA or PFHxS+PFOS
New Exceedance of Guideline Value

Table 6 - Sediment Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting						0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																	
	SD120	08 Jun 2018	0083_SD120_0.0_180608	Normal	212095	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
	SD120	08 Jun 2018	0083_SD120_0.4_180608	Normal	212095	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
	SD120	27 May 2020	0083_SD120_200527	Normal	EP2005480	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	26 Jun 2020	0083_SD120_0.00-0.10_20	Normal	EP2006689	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	18 Nov 2020	0083_SD120_0.00-0.10_20	Normal	EP2012856	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	03 Mar 2021	0083_SD120_210303	Normal	EP2102202	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	22 Jun 2021	0083_SD120_210622	Normal	EP2107187	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	23 Nov 2021	0083_SD120_211123	Normal	EP2114302	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	16 May 2022	0083_SD120_220516	Normal	EP2206114	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	21 Jun 2022	0083_SD120_220621	Normal	EP2207633	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD120	23 Nov 2022	0083_SD120_221123	Normal	EP2215817	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	27 May 2020	0083_SD126_200527	Normal	EP2005480	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	23 Jun 2020	0083_SD126_200623	Normal	EP2006452	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	17 Nov 2020	0083_SD126_201117	Normal	EP2012744	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	03 Mar 2021	0083_SD126_210303	Normal	EP2102349	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	22 Jun 2021	0083_SD126_210622	Normal	EP2107187	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	23 Nov 2021	0083_SD126_211123	Normal	EP2114299	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	16 May 2022	0083_SD126_220516	Normal	EP2206114	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	21 Jun 2022	0083_SD126_220621	Normal	EP2207635	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	23 Nov 2022	0083_SD126_221123	Normal	EP2215817	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD126	27 Jun 2023	0083_SD126_230627	Normal	EP2308615	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	28 Nov 2019	0083_SD127_191128	Normal	EP1912608	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	26 May 2020	0083_SD127_200526	Normal	EP2005404	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	23 Jun 2020	0083_SD127_200623	Normal	EP2006452	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	17 Nov 2020	0083_SD127_201117	Normal	EP2012741	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	03 Mar 2021	0083_SD127_210303	Normal	EP2102349	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	22 Jun 2021	0083_SD127_210622	Normal	EP2107093	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	23 Nov 2021	0083_SD127_211123	Normal	EP2114299	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	16 May 2022	0083_SD127_220516	Normal	EP2206114	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	21 Jun 2022	0083_SD127_220621	Normal	EP2207635	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	24 Nov 2022	0083_SD127_221124	Normal	EP2215849	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD127	27 Jun 2023	0083_SD127_230627	Normal	EP2308615	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	28 Nov 2019	0083_SD128_191128	Normal	EP1912608	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	27 May 2020	0083_SD128_200527	Normal	EP2005480	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	23 Jun 2020	0083_SD128_200623	Normal	EP2006452	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	17 Nov 2020	0083_SD128_201117	Normal	EP2012741	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	03 Mar 2021	0083_SD128_210303	Normal	EP2102202	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	22 Jun 2021	0083_SD128_210622	Normal	EP2107093	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	23 Nov 2021	0083_SD128_211123	Normal	EP2114299	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	16 May 2022	0083_SD128_220516	Normal	EP2206114	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	21 Jun 2022	0083_SD128_220621	Normal	EP2207635	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	24 Nov 2022	0083_SD128_221124	Normal	EP2215849	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD128	27 Jun 2023	0083_SD128_230627	Normal	EP2308615	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
	SD131	27 Jun 2023	0083_SD131_230627	Normal	EP2308615	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005

First Time Detect of PFOA or PFHxS+PFOS

New Exceedance of Guideline Value

Table 6 - Sediment Analytical Results

						PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
						4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting						0.0001	0.0001	0.0001	0.0001	0.0002	0.0004	0.0002	0.0005	0.0004	0.0002	0.0005	0.0002	0.0002	0.0002
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**														
	SD120	08 Jun 2018	0083_SD120_0.0_180608	Normal	212095	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
	SD120	08 Jun 2018	0083_SD120_0.4_180608	Normal	212095	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
	SD120	27 May 2020	0083_SD120_200527	Normal	EP2005480	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	26 Jun 2020	0083_SD120_0.00-0.10_20	Normal	EP2006689	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	18 Nov 2020	0083_SD120_0.00-0.10_20	Normal	EP2012856	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	03 Mar 2021	0083_SD120_210303	Normal	EP2102202	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	22 Jun 2021	0083_SD120_210622	Normal	EP2107187	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	23 Nov 2021	0083_SD120_211123	Normal	EP2114302	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	16 May 2022	0083_SD120_220516	Normal	EP2206114	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	21 Jun 2022	0083_SD120_220621	Normal	EP2207633	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD120	23 Nov 2022	0083_SD120_221123	Normal	EP2215817	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	27 May 2020	0083_SD126_200527	Normal	EP2005480	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	23 Jun 2020	0083_SD126_200623	Normal	EP2006452	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	17 Nov 2020	0083_SD126_201117	Normal	EP2012744	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	03 Mar 2021	0083_SD126_210303	Normal	EP2102349	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	22 Jun 2021	0083_SD126_210622	Normal	EP2107187	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	23 Nov 2021	0083_SD126_211123	Normal	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	16 May 2022	0083_SD126_220516	Normal	EP2206114	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	21 Jun 2022	0083_SD126_220621	Normal	EP2207635	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	23 Nov 2022	0083_SD126_221123	Normal	EP2215817	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD126	27 Jun 2023	0083_SD126_230627	Normal	EP2308615	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	28 Nov 2019	0083_SD127_191128	Normal	EP1912608	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	26 May 2020	0083_SD127_200526	Normal	EP2005404	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	23 Jun 2020	0083_SD127_200623	Normal	EP2006452	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	17 Nov 2020	0083_SD127_201117	Normal	EP2012741	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	03 Mar 2021	0083_SD127_210303	Normal	EP2102349	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	22 Jun 2021	0083_SD127_210622	Normal	EP2107093	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	23 Nov 2021	0083_SD127_211123	Normal	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	16 May 2022	0083_SD127_220516	Normal	EP2206114	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	21 Jun 2022	0083_SD127_220621	Normal	EP2207635	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	24 Nov 2022	0083_SD127_221124	Normal	EP2215849	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD127	27 Jun 2023	0083_SD127_230627	Normal	EP2308615	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	28 Nov 2019	0083_SD128_191128	Normal	EP1912608	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	27 May 2020	0083_SD128_200527	Normal	EP2005480	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	23 Jun 2020	0083_SD128_200623	Normal	EP2006452	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	17 Nov 2020	0083_SD128_201117	Normal	EP2012741	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	03 Mar 2021	0083_SD128_210303	Normal	EP2102202	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	22 Jun 2021	0083_SD128_210622	Normal	EP2107093	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	23 Nov 2021	0083_SD128_211123	Normal	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	16 May 2022	0083_SD128_220516	Normal	EP2206114	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	21 Jun 2022	0083_SD128_220621	Normal	EP2207635	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	24 Nov 2022	0083_SD128_221124	Normal	EP2215849	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
	SD128	27 Jun 2023	0083_SD128_230627	Normal	EP2308615	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
	SD131	27 Jun 2023	0083_SD131_230627	Normal	EP2308615	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

First Time Detect of PFOA or PFHxS+PFOS

New Exceedance of Guideline Value

Trend Report

Report Date & Time: 2024-02-29 10:24:19

Data File Name: Broad.csv

Report Title: Groundwater Trend Data

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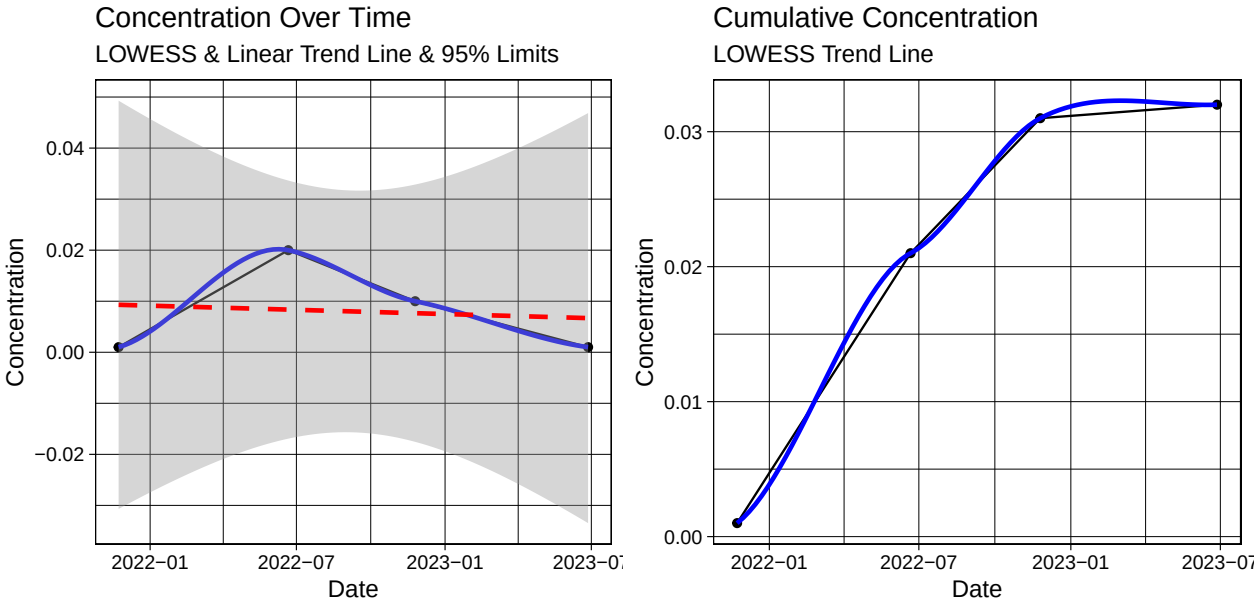
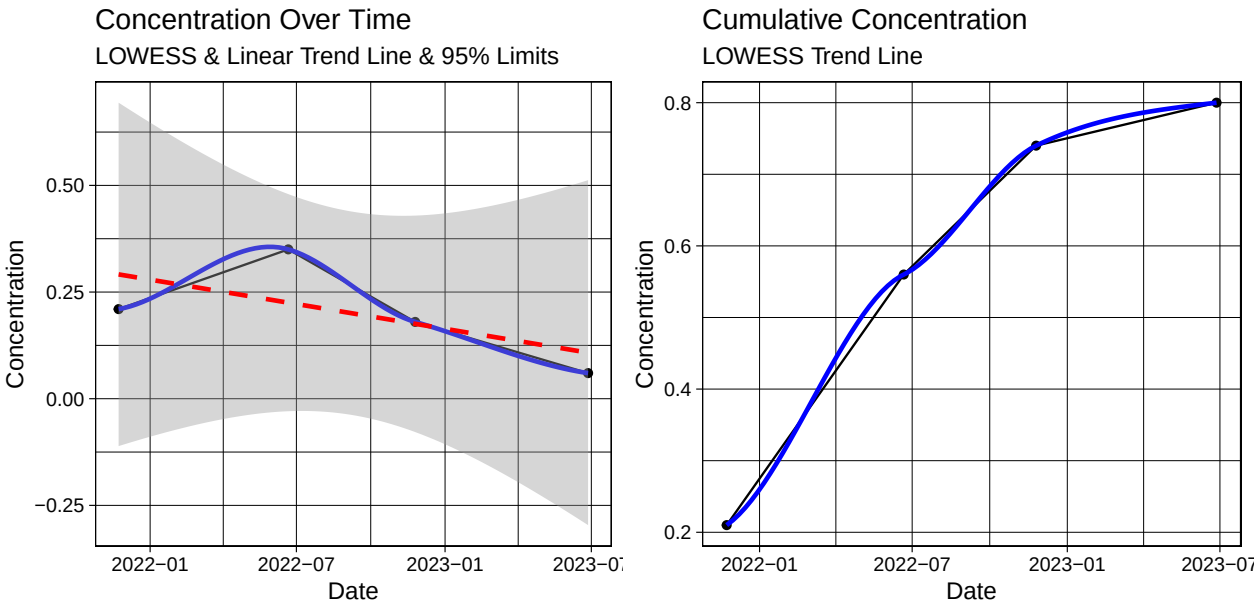
Kendall Trend Test Results Continuous	
n	4
z	0
p	1
S	-1
varS	7.67
tau	-0.18
mean	0.01
sd	0.01
cov	1.13
results	NO CLEAR TREND

Report for ID : MW004 and Analyte : PFOA



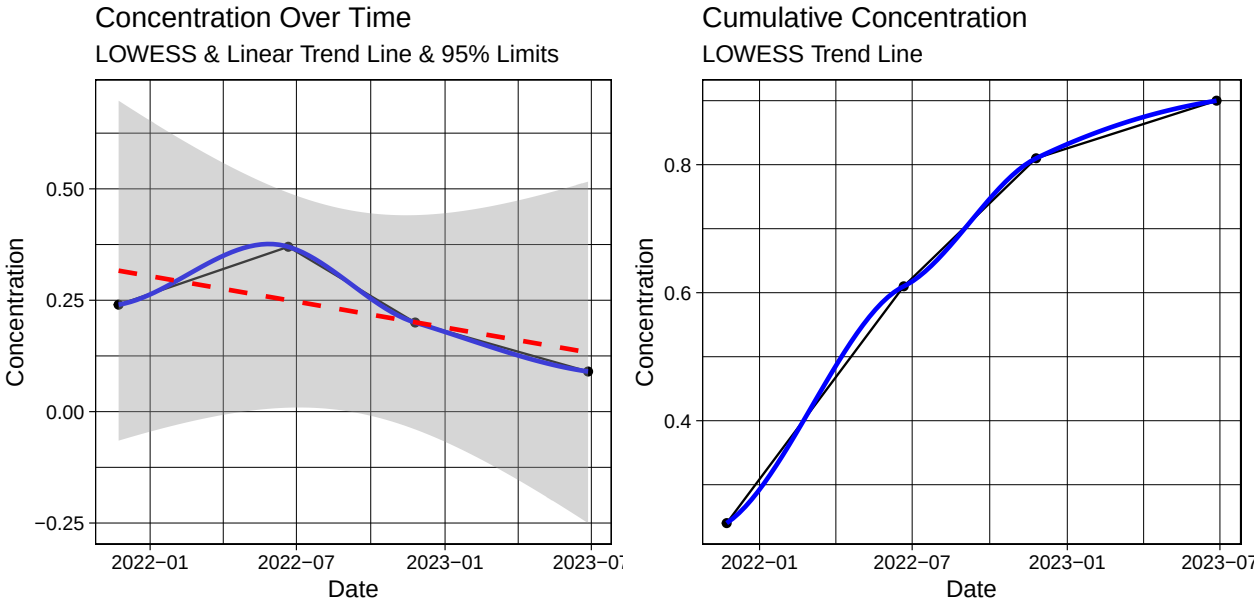
Kendall Trend Test Results Continuous	
n	4
z	-1.02
p	0.31
S	-4
varS	8.67
tau	-0.67
mean	0.2
sd	0.12
cov	0.6
results	STABLE

Report for ID : MW004 and Analyte : PFOS



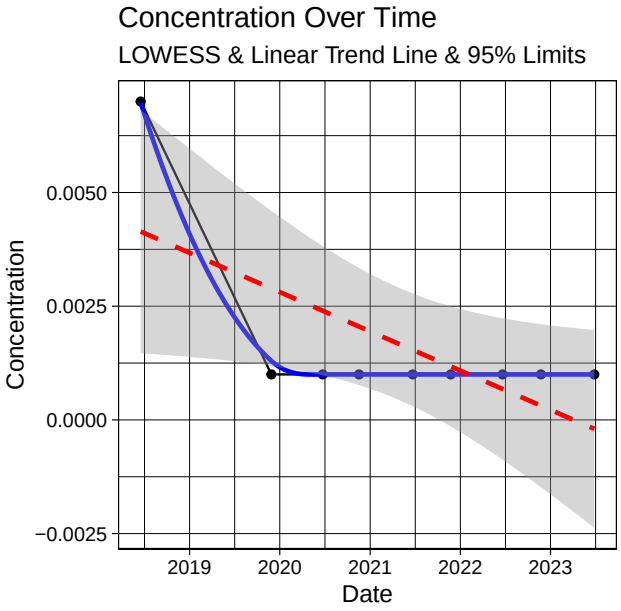
Kendall Trend Test Results Continuous	
n	4
z	-1.02
p	0.31
S	-4
varS	8.67
tau	-0.67
mean	0.22
sd	0.12
cov	0.51
results	STABLE

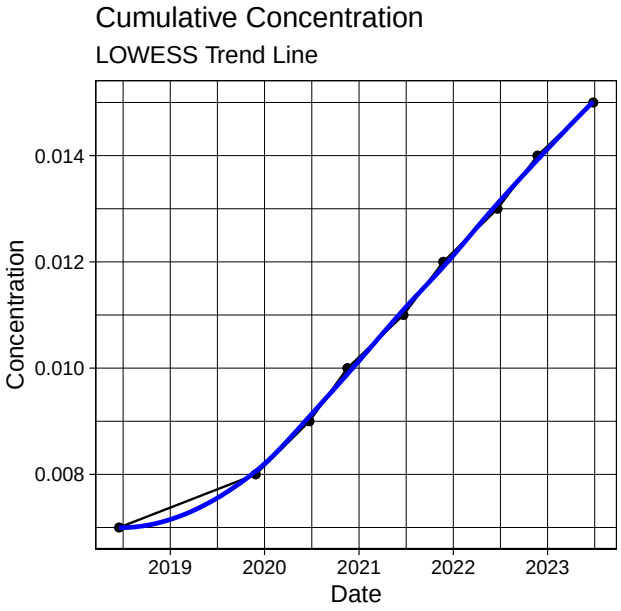
Report for ID : MW004 and Analyte : SumofPFOSandPFHxS



Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	1.2
results	NO CLEAR TREND

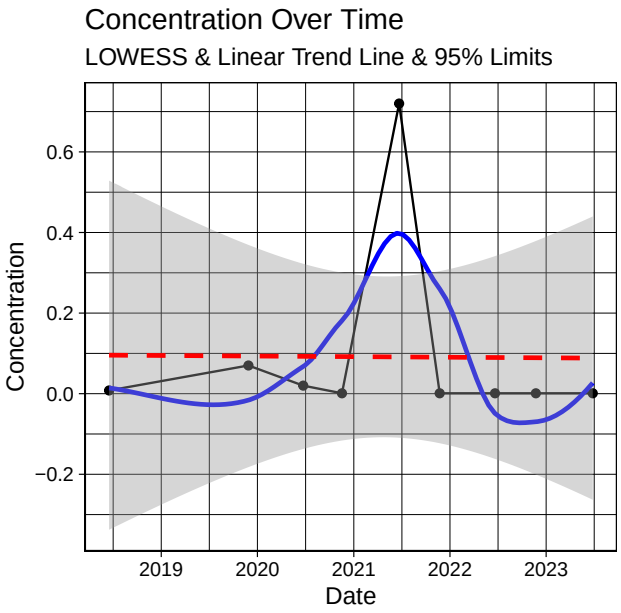
Report for ID : MW129 and Analyte : PFOA

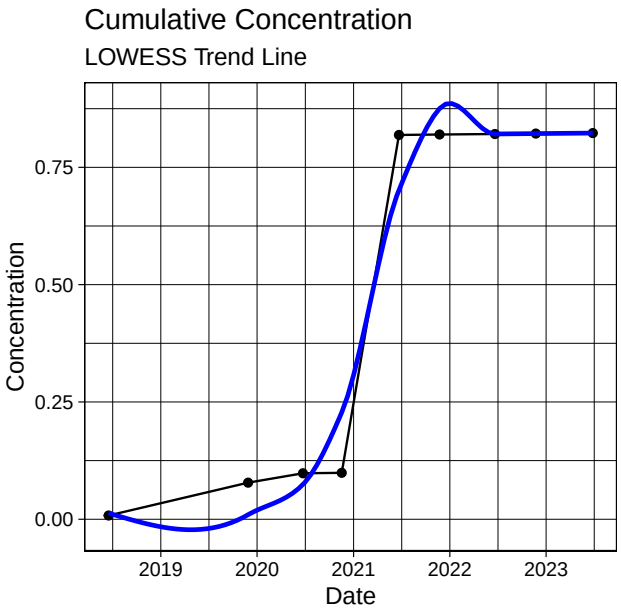




Kendall Trend Test Results Continuous	
n	9
z	-1.5
p	0.13
S	-14
varS	75.33
tau	-0.46
mean	0.09
sd	0.24
cov	2.59
results	NO CLEAR TREND

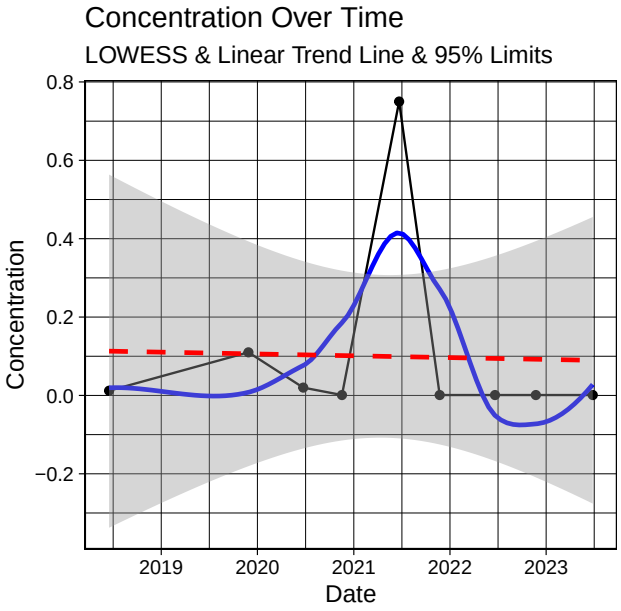
Report for ID : MW129 and Analyte : PFOS

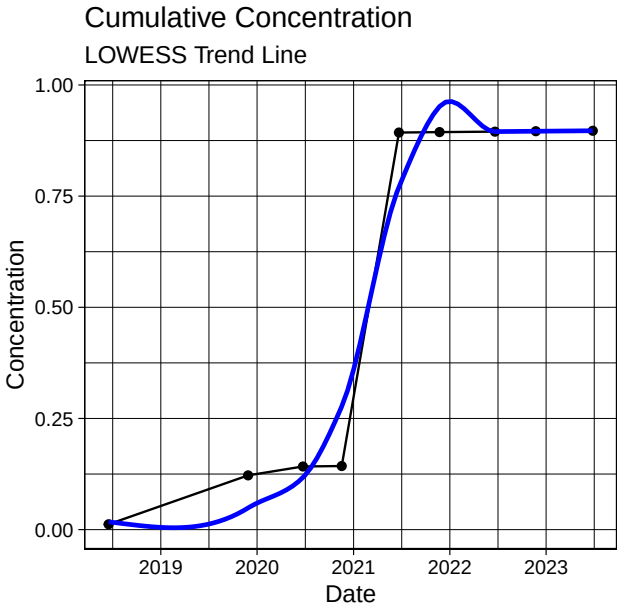




Kendall Trend Test Results Continuous	
n	9
z	-1.5
p	0.13
S	-14
varS	75.33
tau	-0.46
mean	0.1
sd	0.25
cov	2.47
results	NO CLEAR TREND

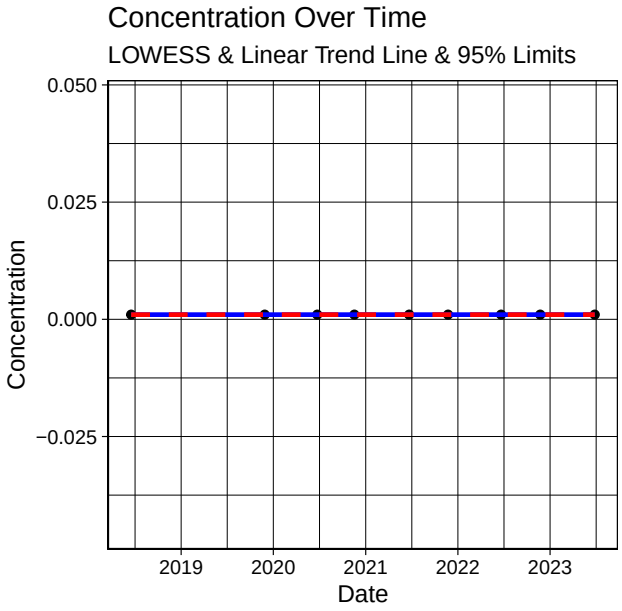
Report for ID : MW129 and Analyte : SumofPFOSandPFHxS

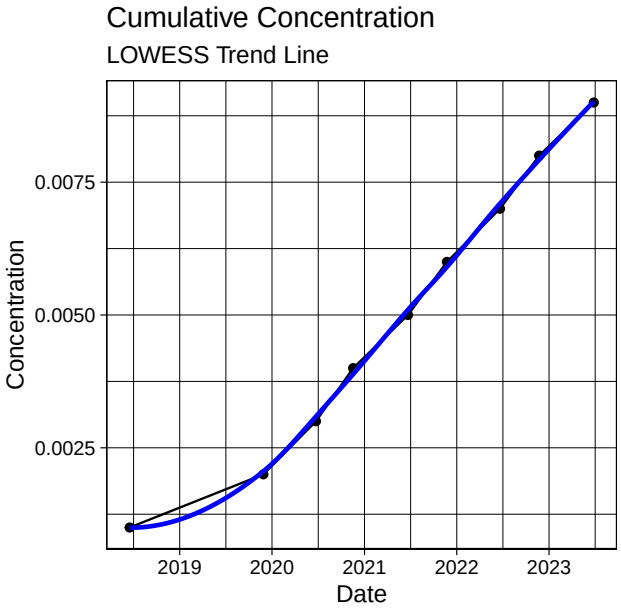




Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

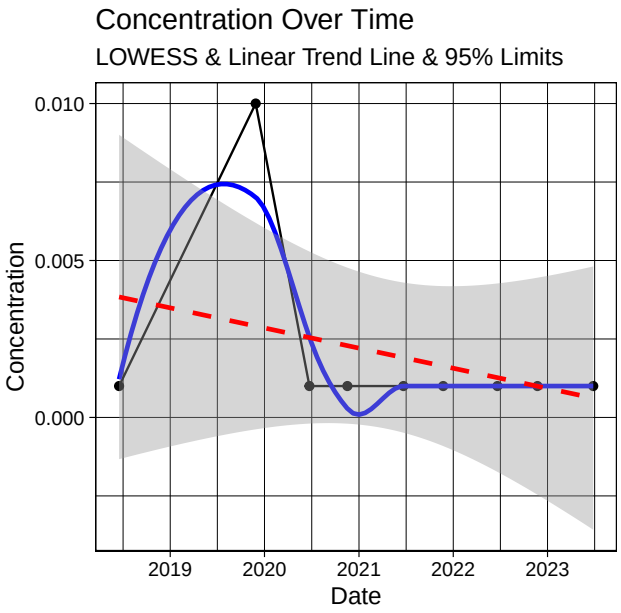
Report for ID : MW130 and Analyte : PFOA

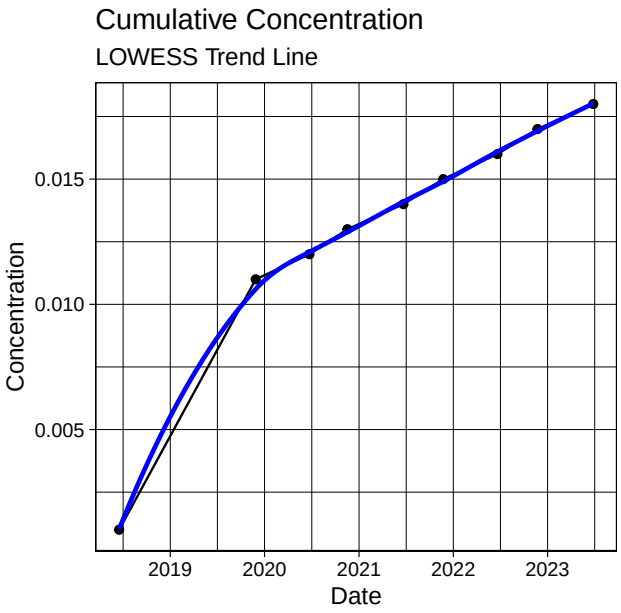




Kendall Trend Test Results Continuous	
n	9
z	-0.97
p	0.33
S	-6
varS	26.67
tau	-0.35
mean	0
sd	0
cov	1.5
results	NO CLEAR TREND

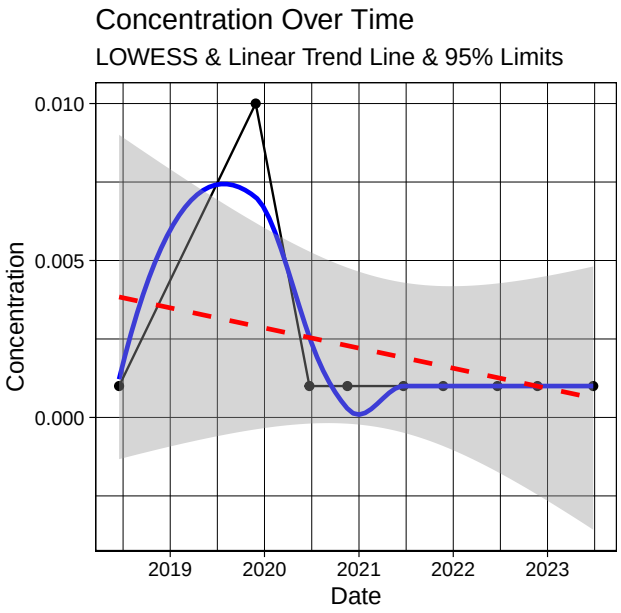
Report for ID : MW130 and Analyte : PFOS

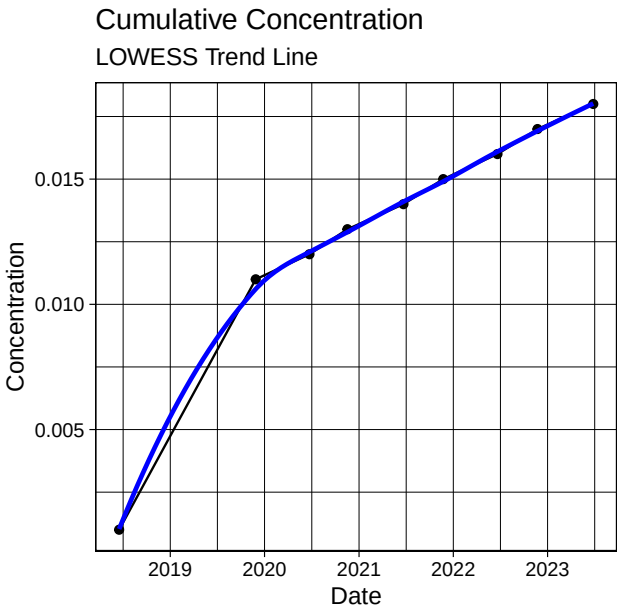




Kendall Trend Test Results Continuous	
n	9
z	-0.97
p	0.33
S	-6
varS	26.67
tau	-0.35
mean	0
sd	0
cov	1.5
results	NO CLEAR TREND

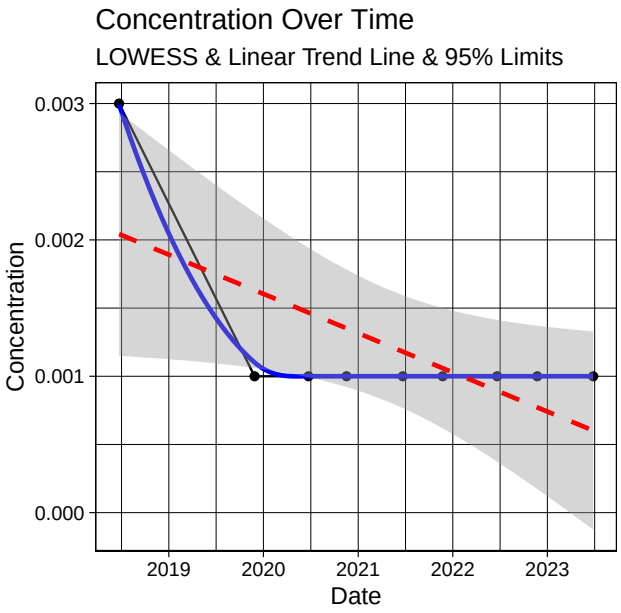
Report for ID : MW130 and Analyte : SumofPFOSandPFHxS

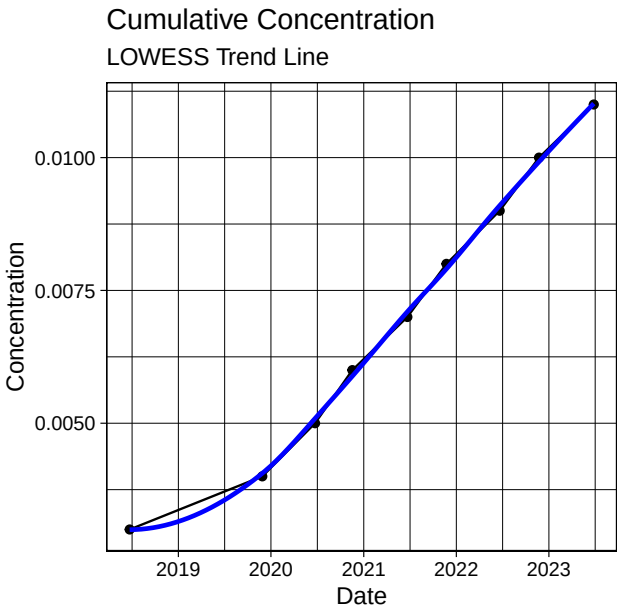




Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	0.55
results	STABLE

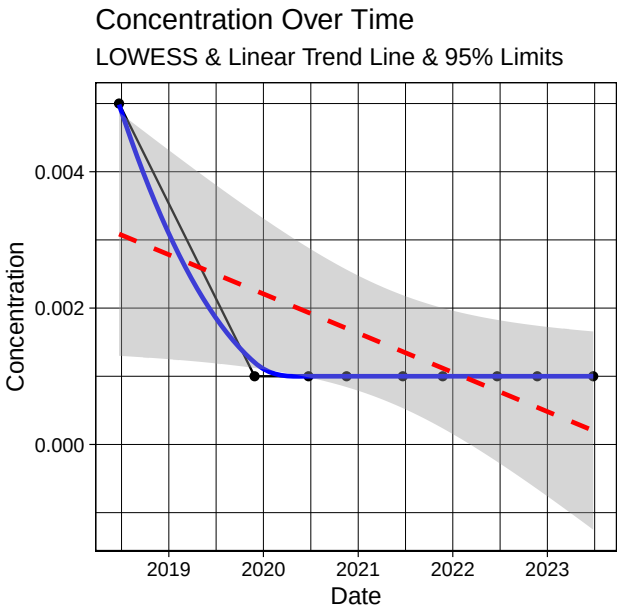
Report for ID : MW134 and Analyte : PFOA

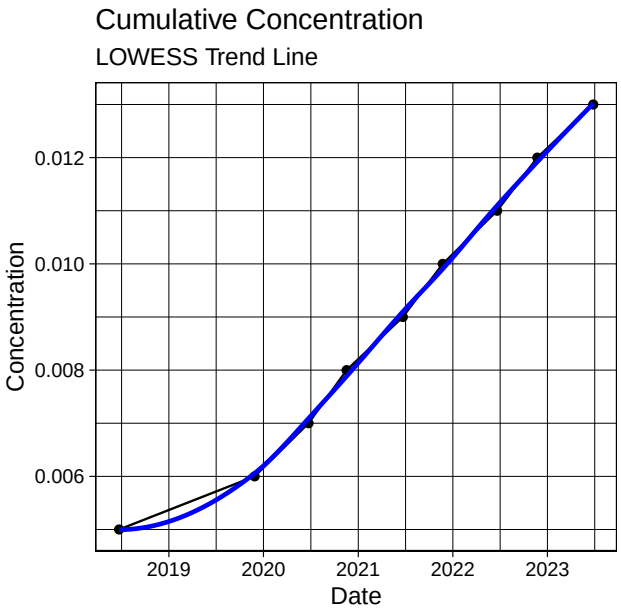




Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	0.92
results	STABLE

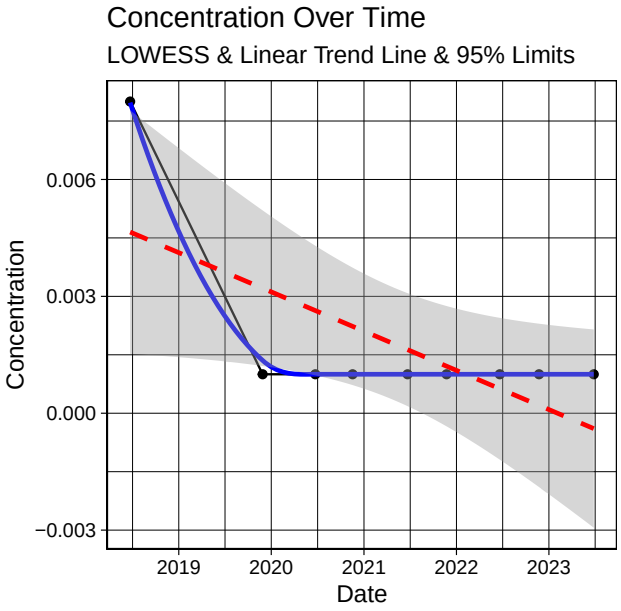
Report for ID : MW134 and Analyte : PFOS

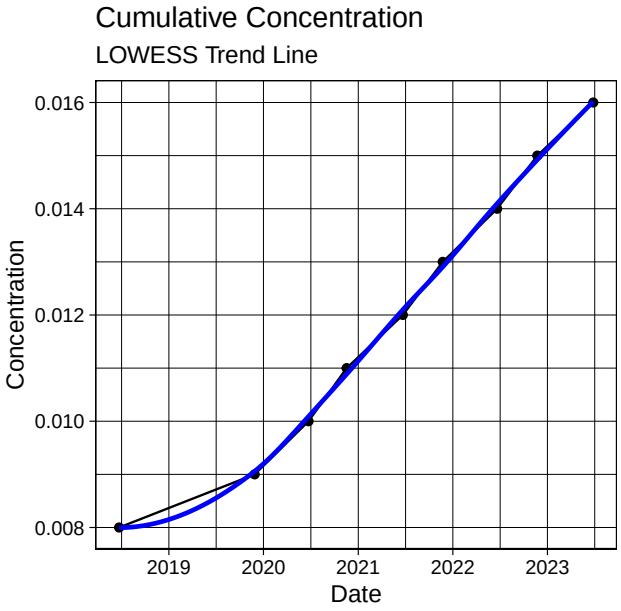




Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	1.31
results	NO CLEAR TREND

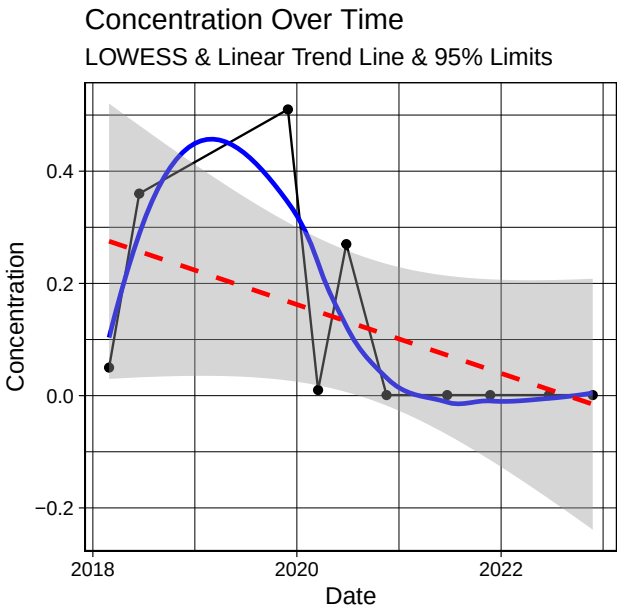
Report for ID : MW134 and Analyte : SumofPFOSandPFHxS

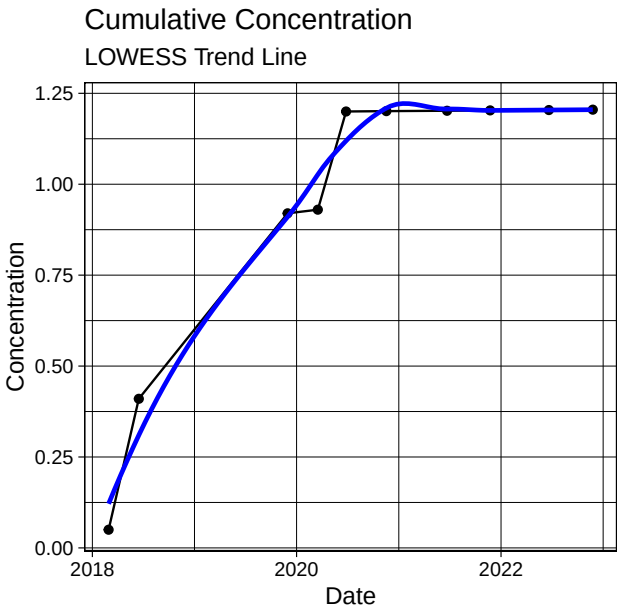




Kendall Trend Test Results Continuous	
n	10
z	-2.31
p	0.02
S	-25
varS	108.33
tau	-0.63
mean	0.12
sd	0.19
cov	1.56
results	DECREASING

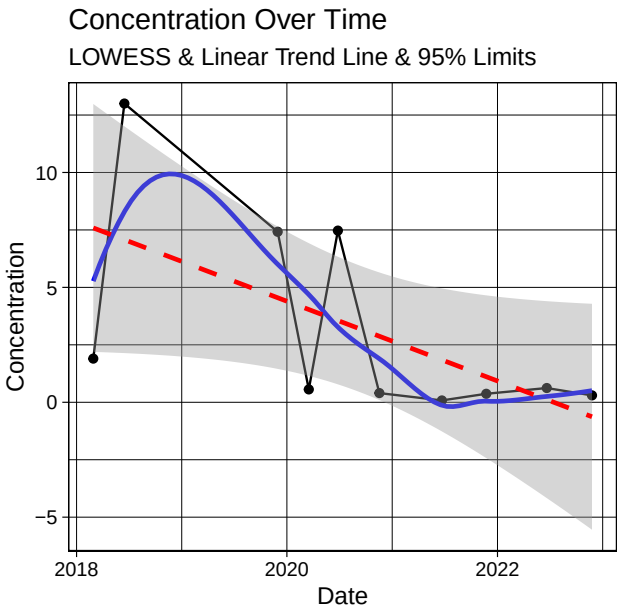
Report for ID : MW008 and Analyte : PFOA

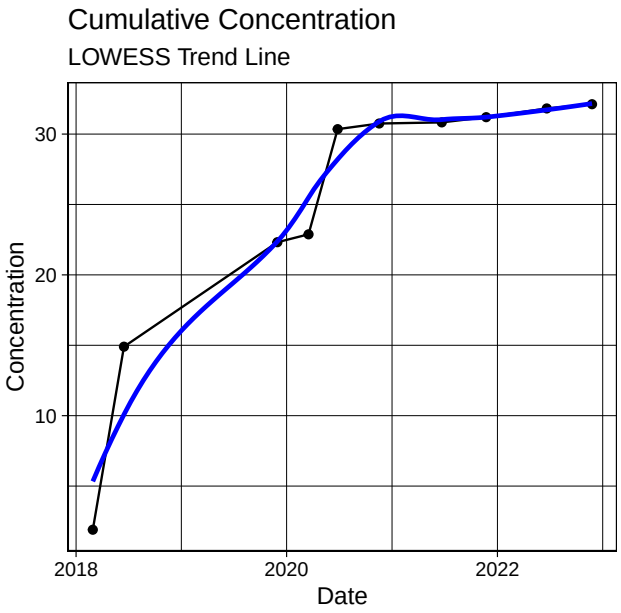




Kendall Trend Test Results Continuous	
n	10
z	-1.97
p	0.05
S	-23
varS	125
tau	-0.51
mean	3.21
sd	4.49
cov	1.4
results	DECREASING

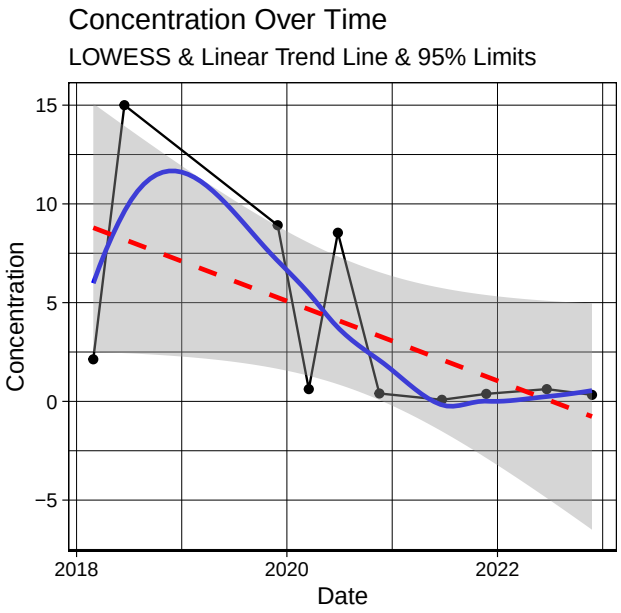
Report for ID : MW008 and Analyte : PFOS

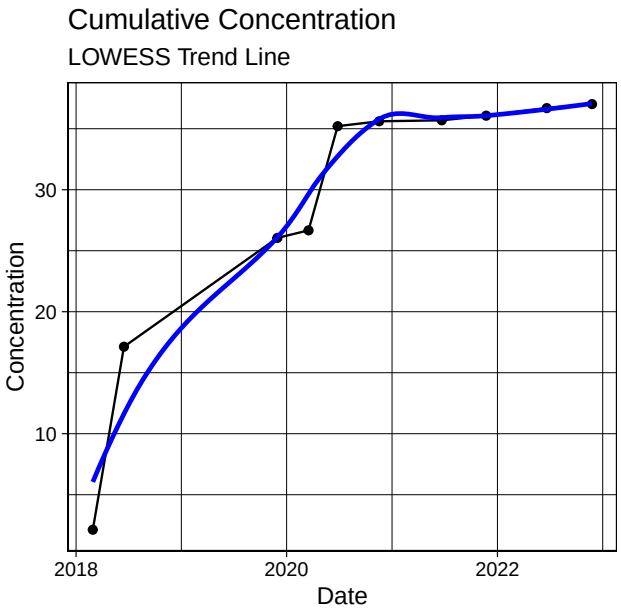




Kendall Trend Test Results Continuous	
n	10
z	-2.25
p	0.02
S	-26
varS	124
tau	-0.58
mean	3.7
sd	5.23
cov	1.41
results	DECREASING

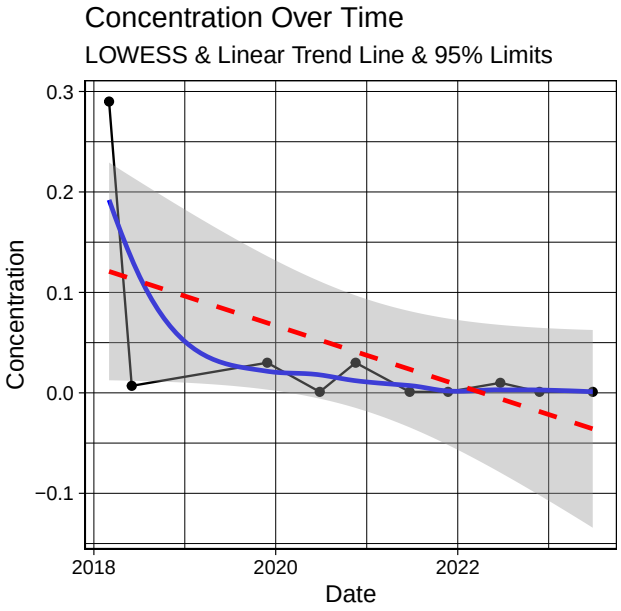
Report for ID : MW008 and Analyte : SumofPFOSandPFHxS

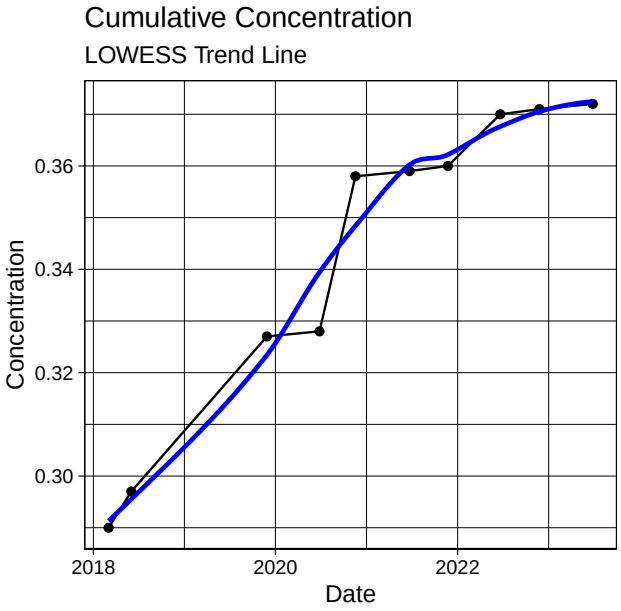




Kendall Trend Test Results Continuous	
n	10
z	-1.83
p	0.07
S	-20
varS	107.33
tau	-0.51
mean	0.04
sd	0.09
cov	2.41
results	POSSIBLY DECREASING

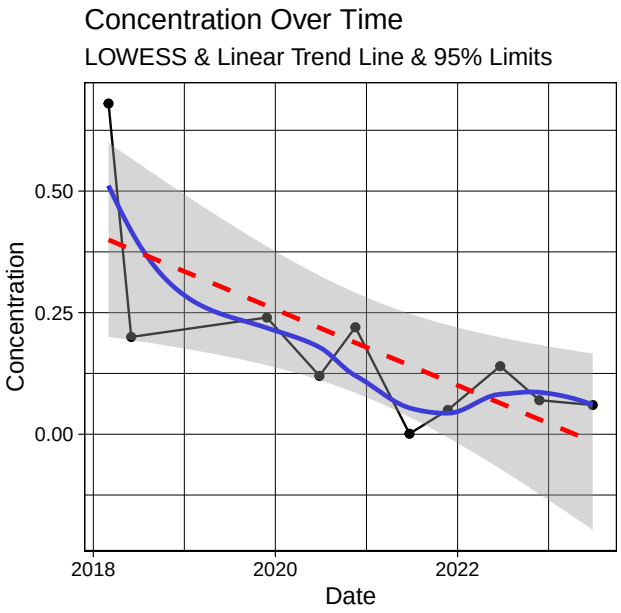
Report for ID : MW105 and Analyte : PFOA

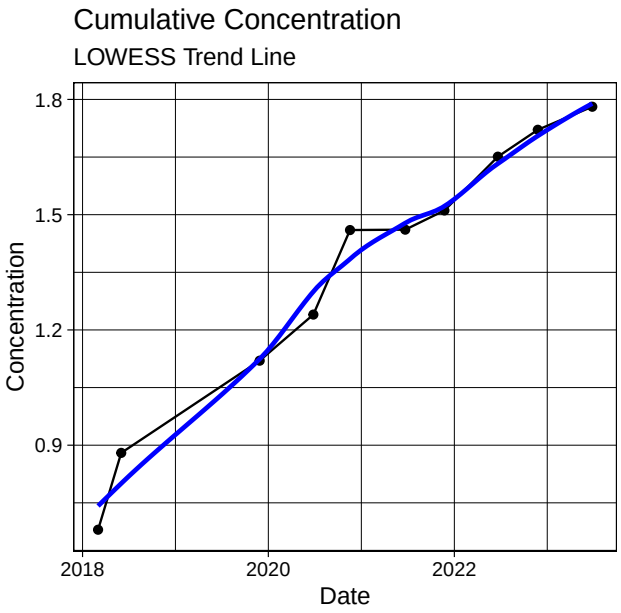




Kendall Trend Test Results Continuous	
n	10
z	-1.97
p	0.05
S	-23
varS	125
tau	-0.51
mean	0.18
sd	0.19
cov	1.09
results	DECREASING

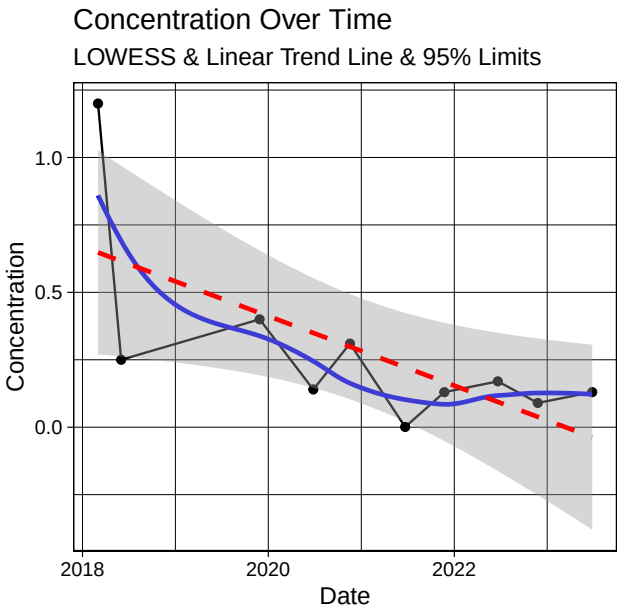
Report for ID : MW105 and Analyte : PFOS

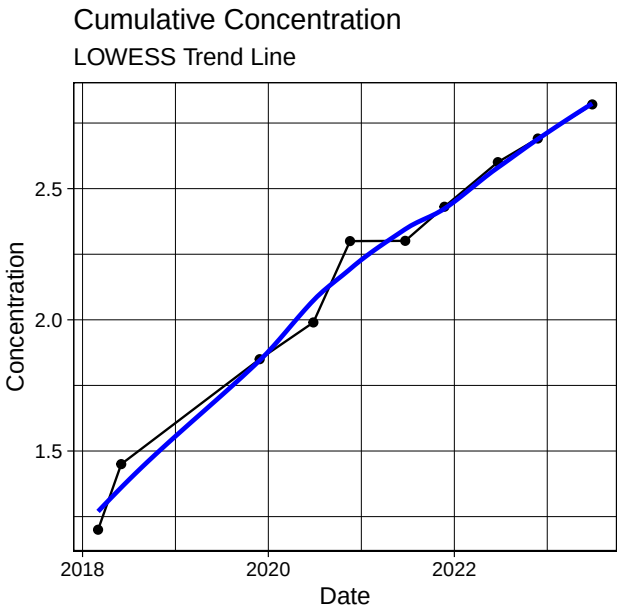




Kendall Trend Test Results Continuous	
n	10
z	-2.07
p	0.04
S	-24
varS	124
tau	-0.54
mean	0.28
sd	0.34
cov	1.21
results	DECREASING

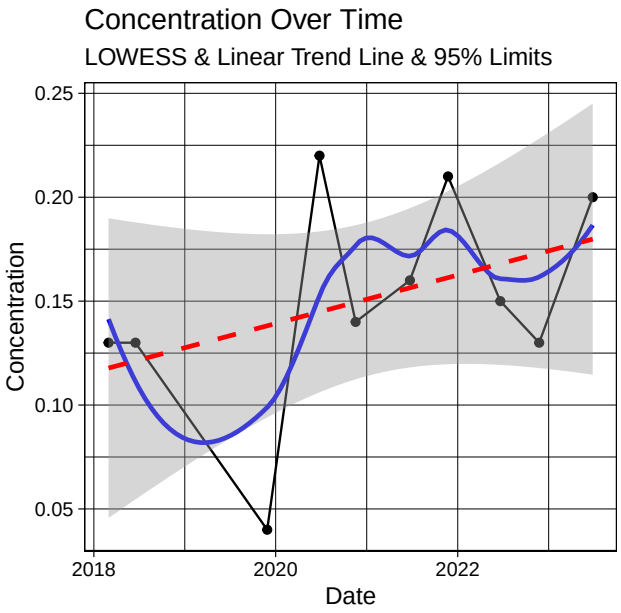
Report for ID : MW105 and Analyte : SumofPFOSandPFHxS

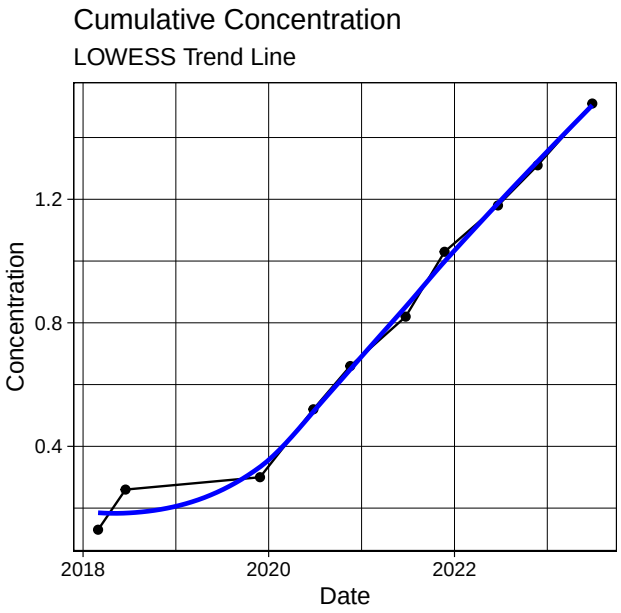




Kendall Trend Test Results Continuous	
n	10
z	1
p	0.32
S	12
varS	121.33
tau	0.28
mean	0.15
sd	0.05
cov	0.35
results	NO CLEAR TREND

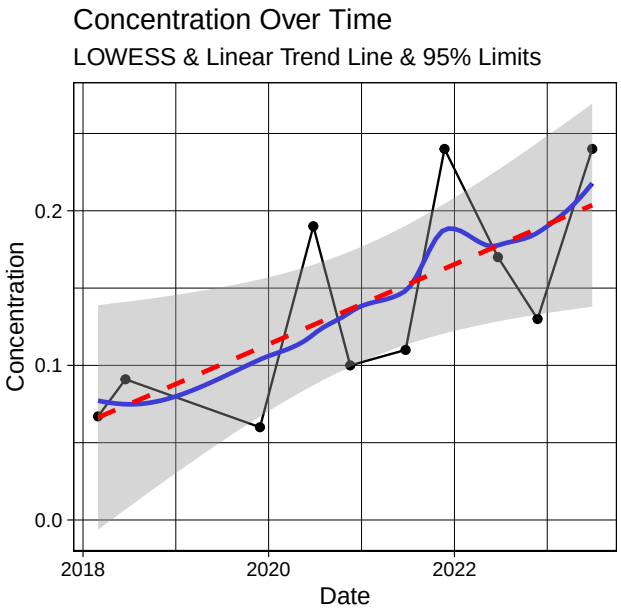
Report for ID : MW119 and Analyte : PFOA

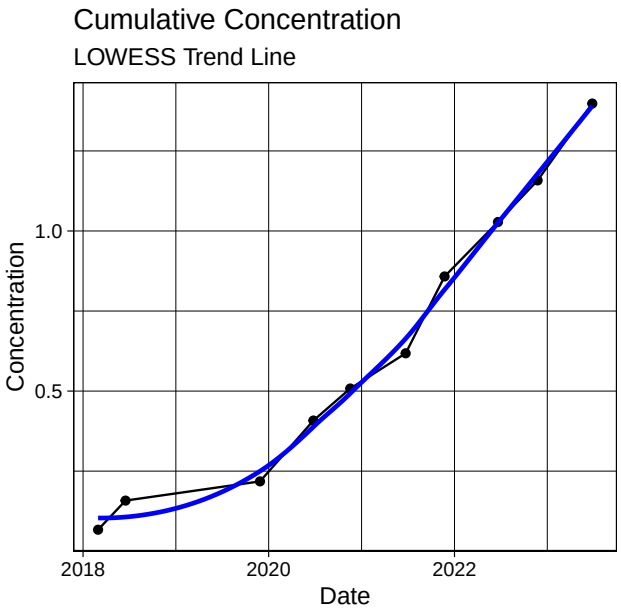




Kendall Trend Test Results Continuous	
n	10
z	2.25
p	0.02
S	26
varS	124
tau	0.58
mean	0.14
sd	0.07
cov	0.48
results	INCREASING

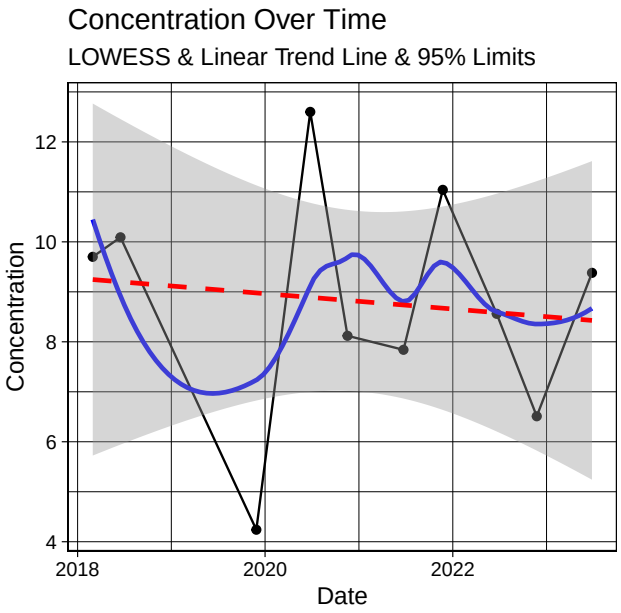
Report for ID : MW119 and Analyte : PFOS

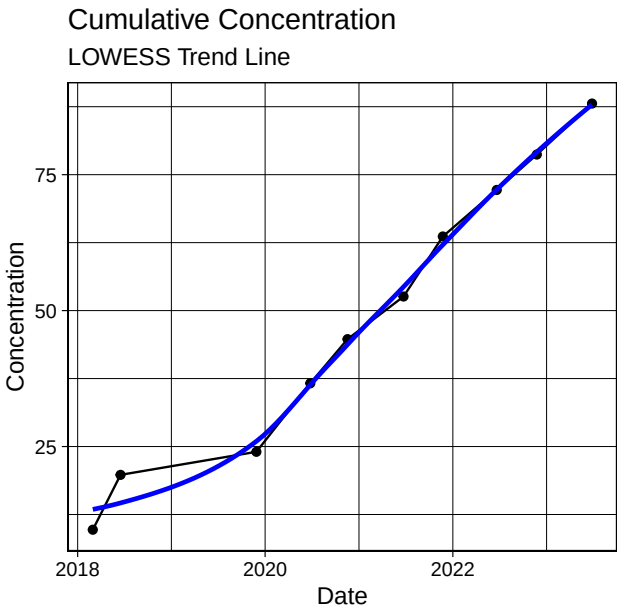




Kendall Trend Test Results Continuous	
n	10
z	-0.36
p	0.72
S	-5
varS	125
tau	-0.11
mean	8.81
sd	2.35
cov	0.27
results	STABLE

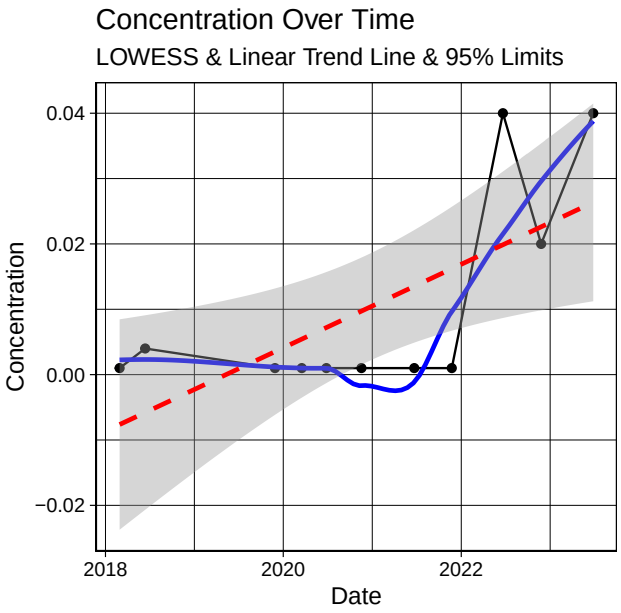
Report for ID : MW119 and Analyte : SumofPFOSandPFHxS

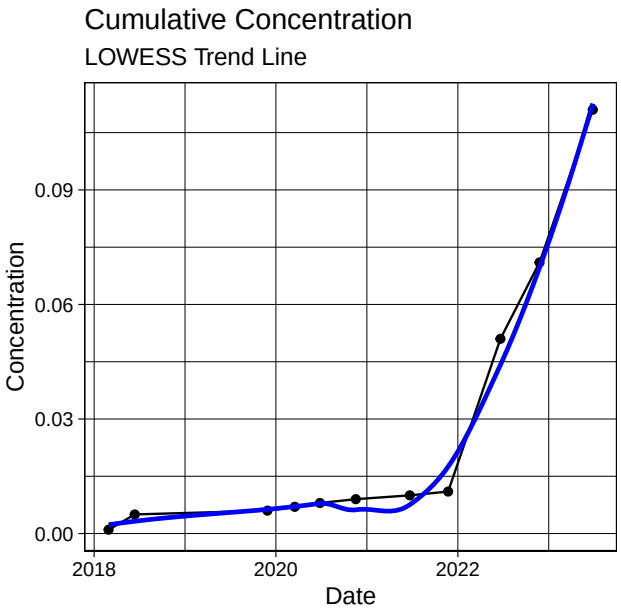




Kendall Trend Test Results Continuous	
n	11
z	1.65
p	0.1
S	19
varS	119.67
tau	0.45
mean	0.01
sd	0.02
cov	1.57
results	POSSIBLY INCREASING

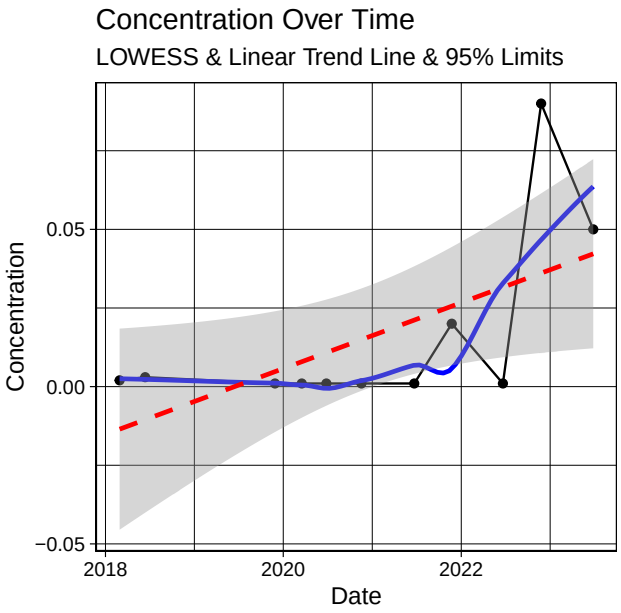
Report for ID : MW210 and Analyte : PFOA

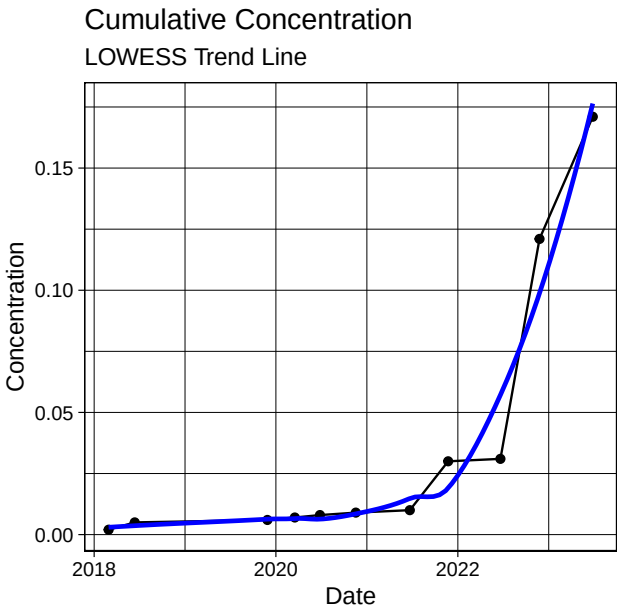




Kendall Trend Test Results Continuous	
n	11
z	0.94
p	0.35
S	12
varS	136.67
tau	0.26
mean	0.02
sd	0.03
cov	1.86
results	NO CLEAR TREND

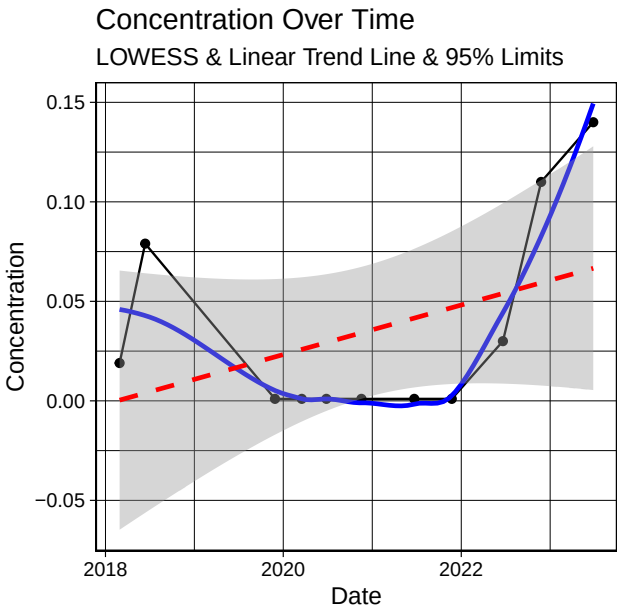
Report for ID : MW210 and Analyte : PFOS

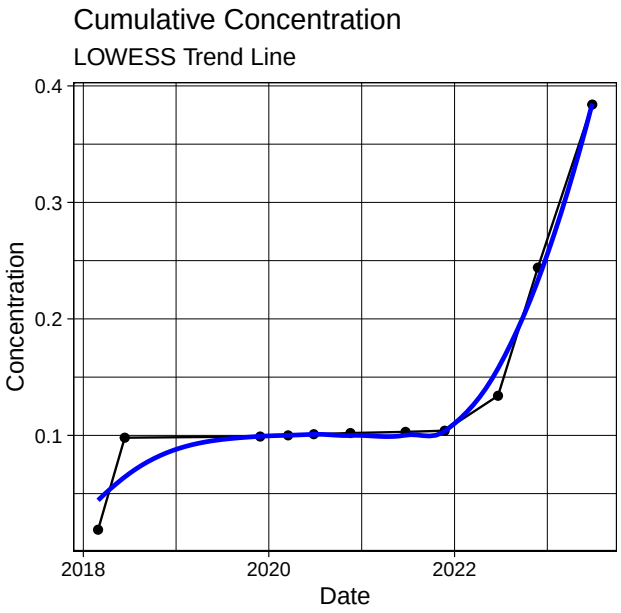




Kendall Trend Test Results Continuous	
n	11
z	1.11
p	0.27
S	14
varS	136.67
tau	0.3
mean	0.03
sd	0.05
cov	1.46
results	NO CLEAR TREND

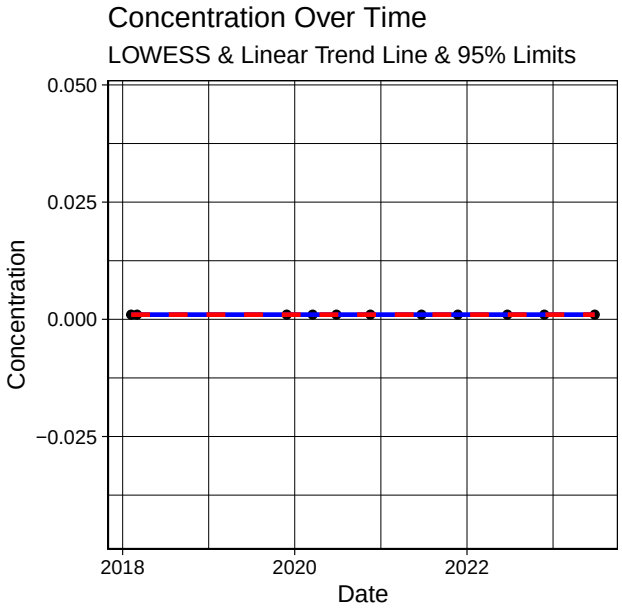
Report for ID : MW210 and Analyte : SumofPFOSandPFHxS

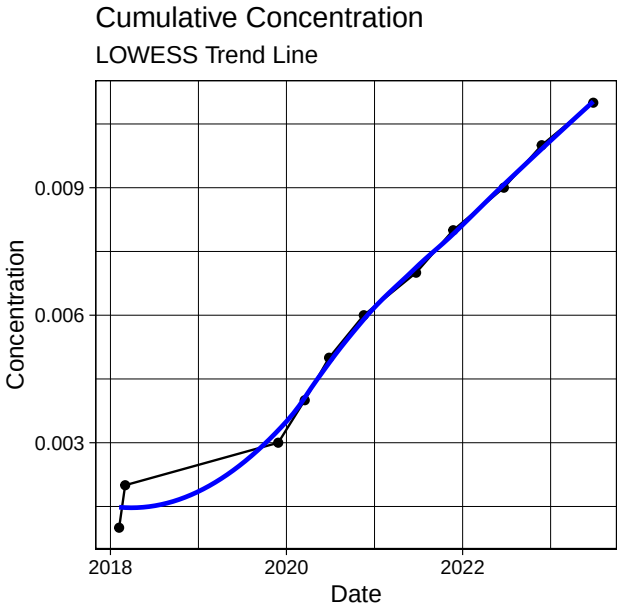




Kendall Trend Test Results Continuous	
n	11
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

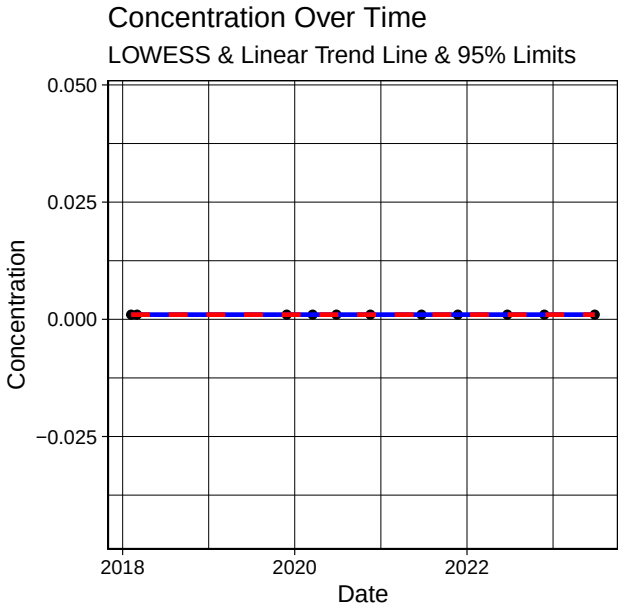
Report for ID : MW212 and Analyte : PFOA

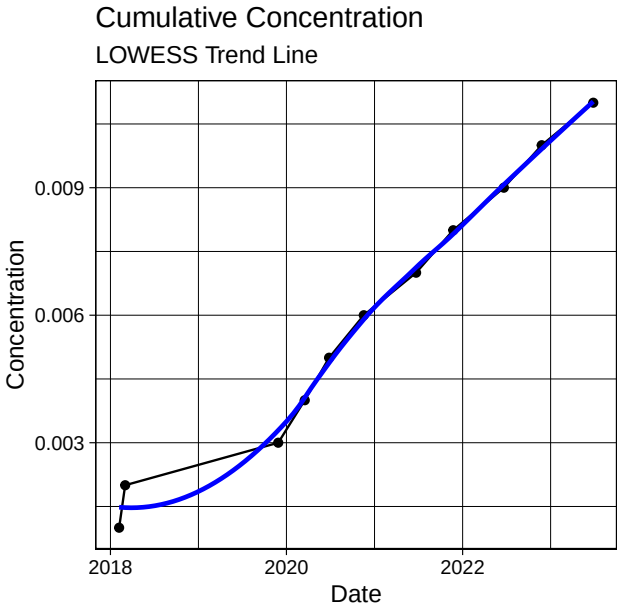




Kendall Trend Test Results Continuous	
n	11
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

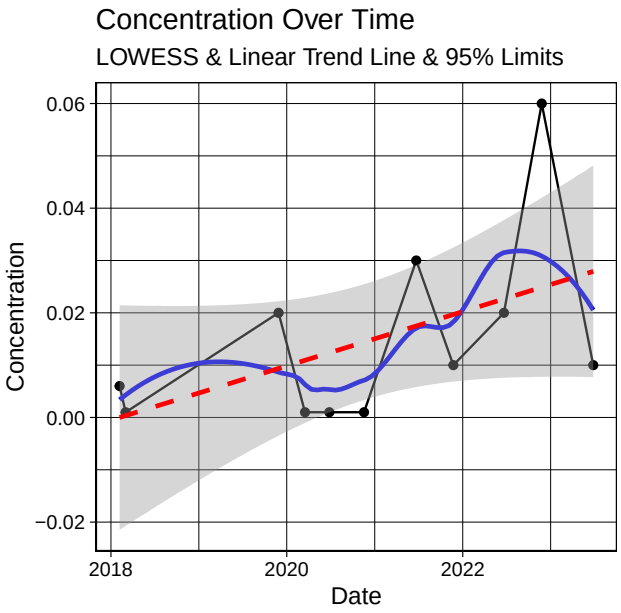
Report for ID : MW212 and Analyte : PFOS

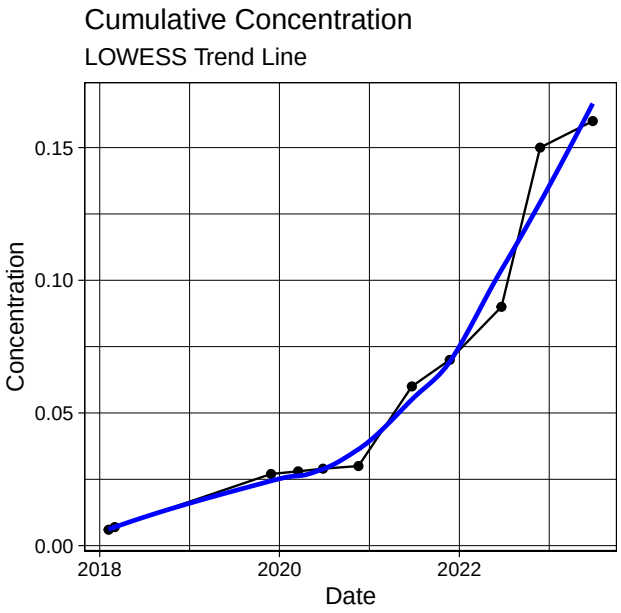




Kendall Trend Test Results Continuous	
n	11
z	1.45
p	0.15
S	19
varS	154.33
tau	0.37
mean	0.01
sd	0.02
cov	1.23
results	NO CLEAR TREND

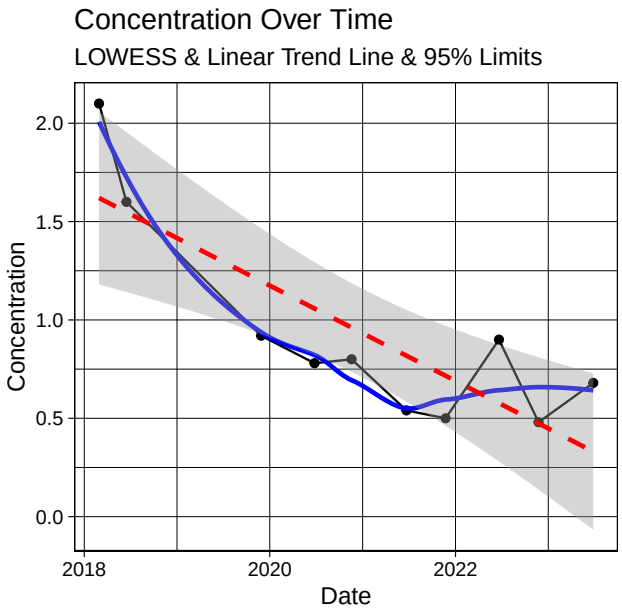
Report for ID : MW212 and Analyte : SumofPFOSandPFHxS

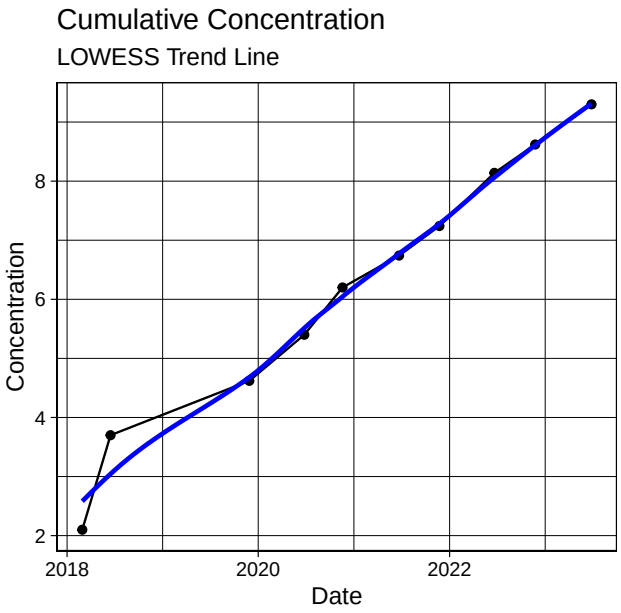




Kendall Trend Test Results Continuous	
n	10
z	-2.5
p	0.01
S	-29
varS	125
tau	-0.64
mean	0.93
sd	0.52
cov	0.56
results	DECREASING

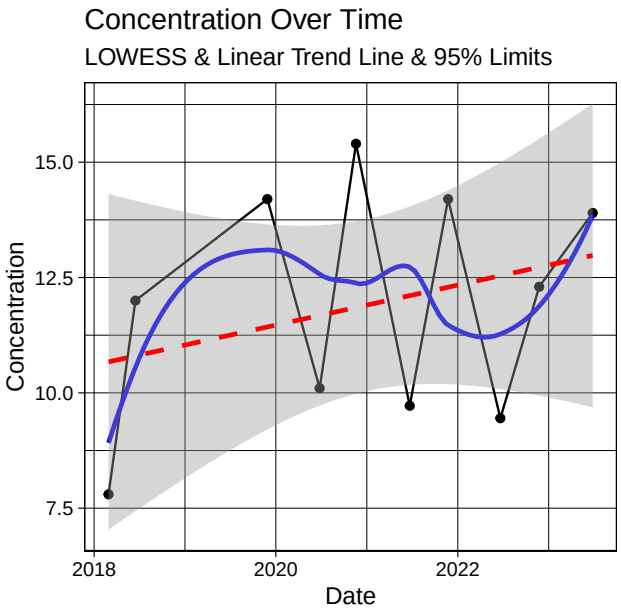
Report for ID : MW017 and Analyte : PFOA

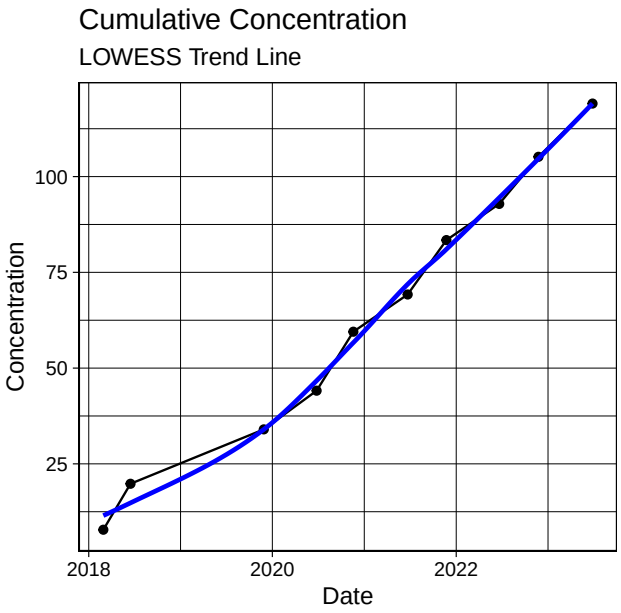




Kendall Trend Test Results Continuous	
n	10
z	0.45
p	0.65
S	6
varS	124
tau	0.13
mean	11.91
sd	2.53
cov	0.21
results	NO CLEAR TREND

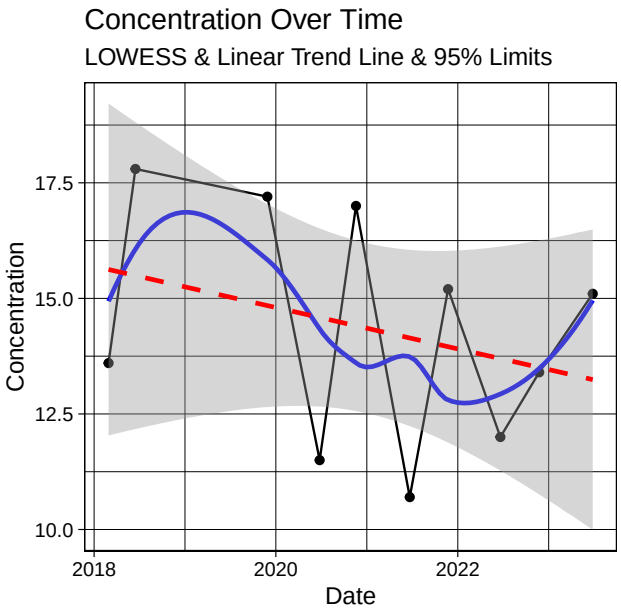
Report for ID : MW017 and Analyte : PFOS

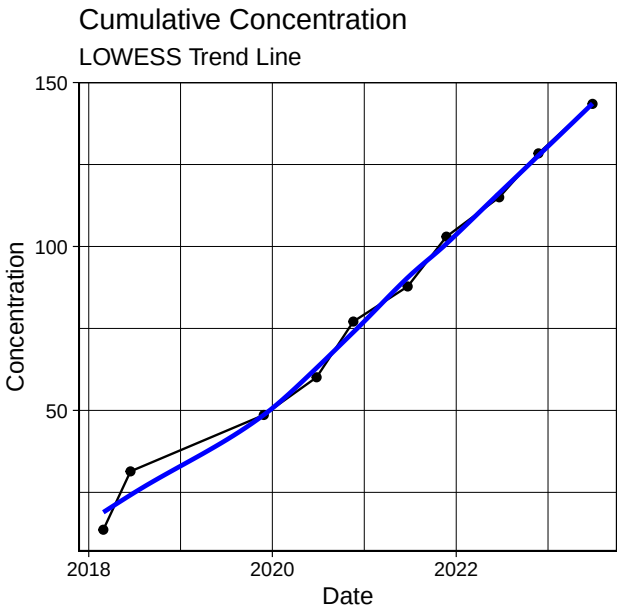




Kendall Trend Test Results Continuous	
n	10
z	-0.89
p	0.37
S	-11
varS	125
tau	-0.24
mean	14.35
sd	2.51
cov	0.18
results	STABLE

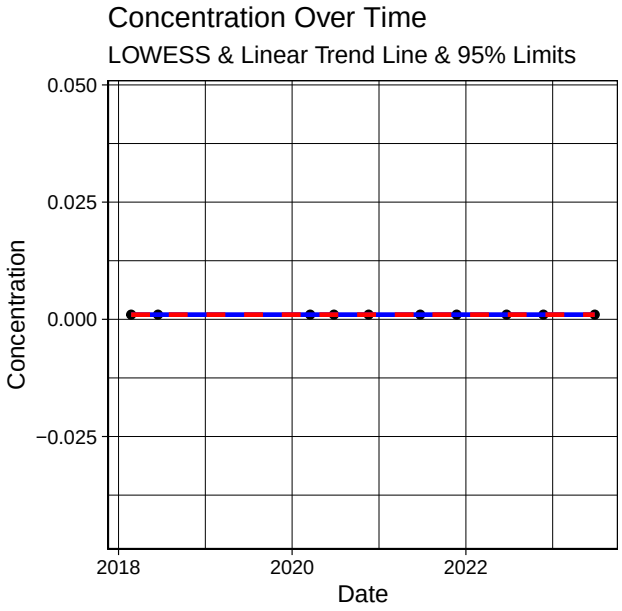
Report for ID : MW017 and Analyte : SumofPFOSandPFHxS

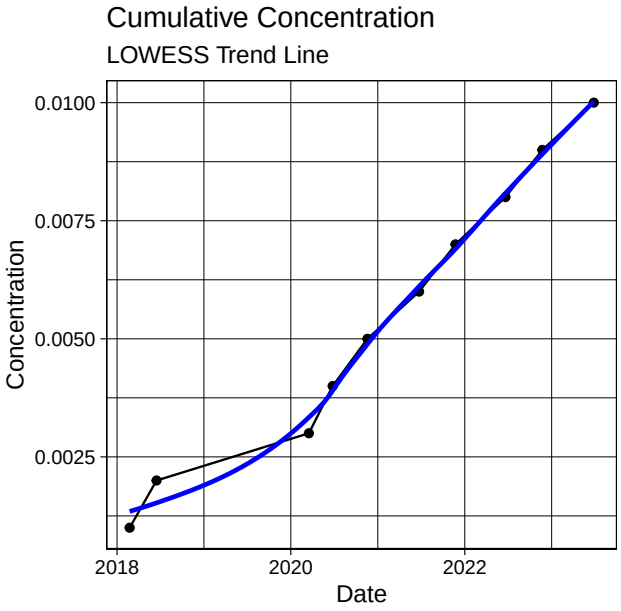




Kendall Trend Test Results Continuous	
n	10
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

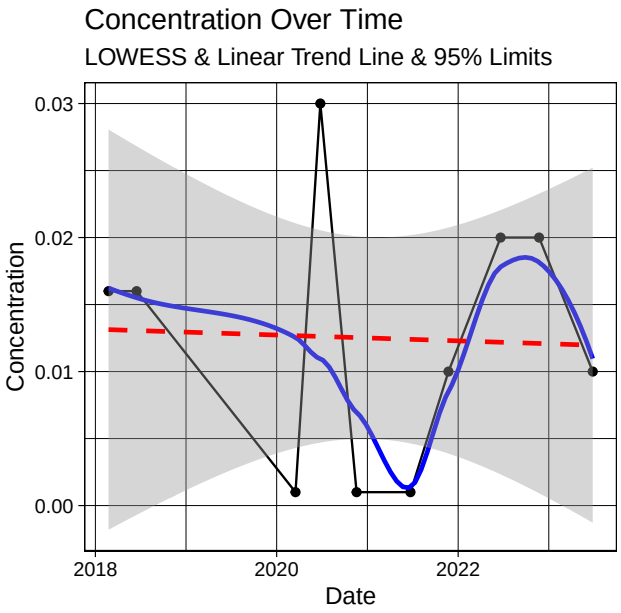
Report for ID : MW019 and Analyte : PFOA

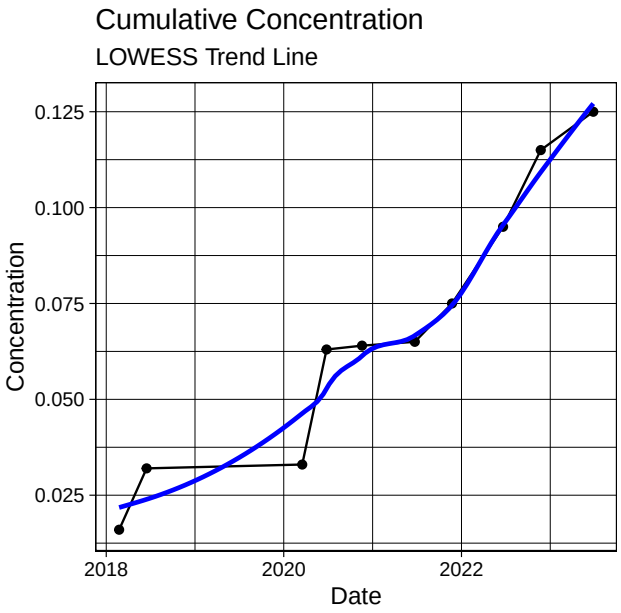




Kendall Trend Test Results Continuous	
n	10
z	0.18
p	0.85
S	3
varS	118.33
tau	0.07
mean	0.01
sd	0.01
cov	0.78
results	NO CLEAR TREND

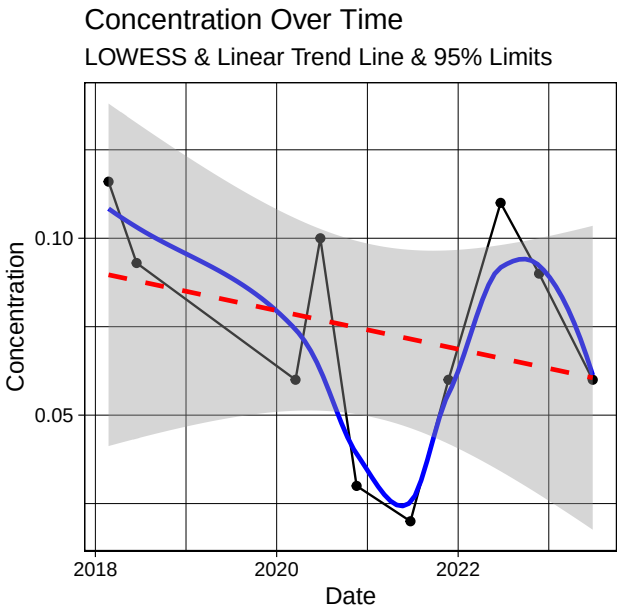
Report for ID : MW019 and Analyte : PFOS

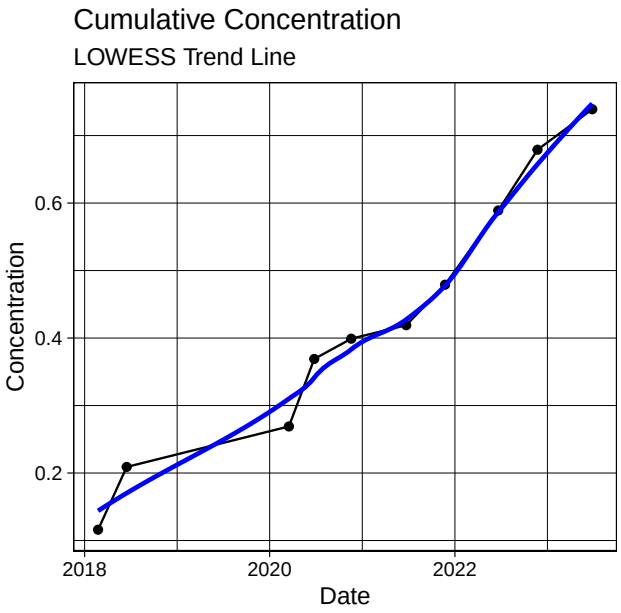




Kendall Trend Test Results Continuous	
n	10
z	-0.82
p	0.41
S	-10
varS	121.33
tau	-0.23
mean	0.07
sd	0.03
cov	0.45
results	STABLE

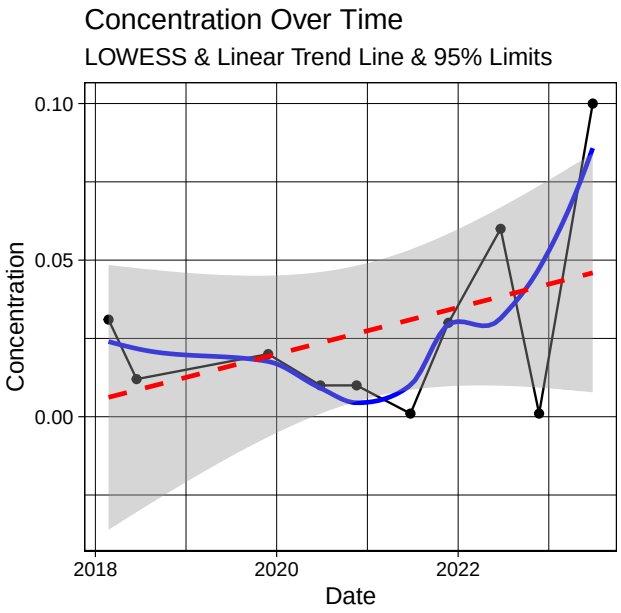
Report for ID : MW019 and Analyte : SumofPFOSandPFHxS

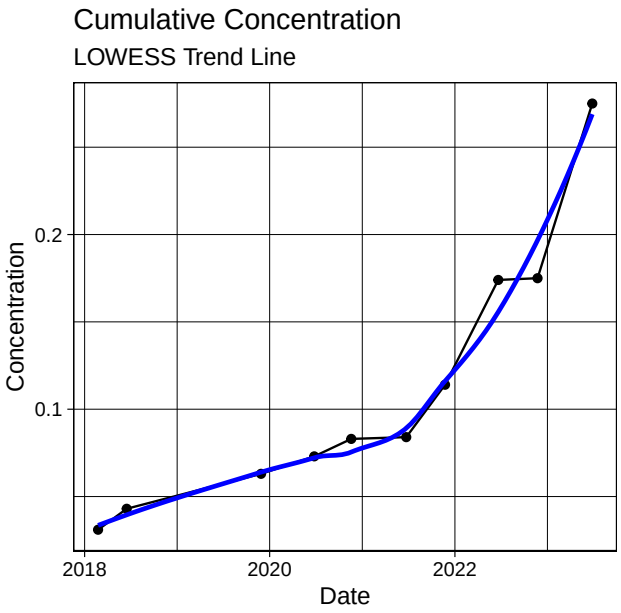




Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	1
varS	123
tau	0.02
mean	0.03
sd	0.03
cov	1.13
results	NO CLEAR TREND

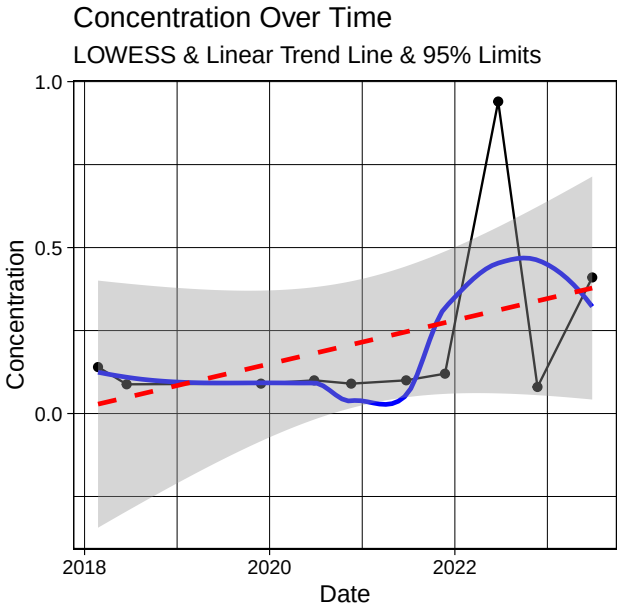
Report for ID : MW027 and Analyte : PFOA

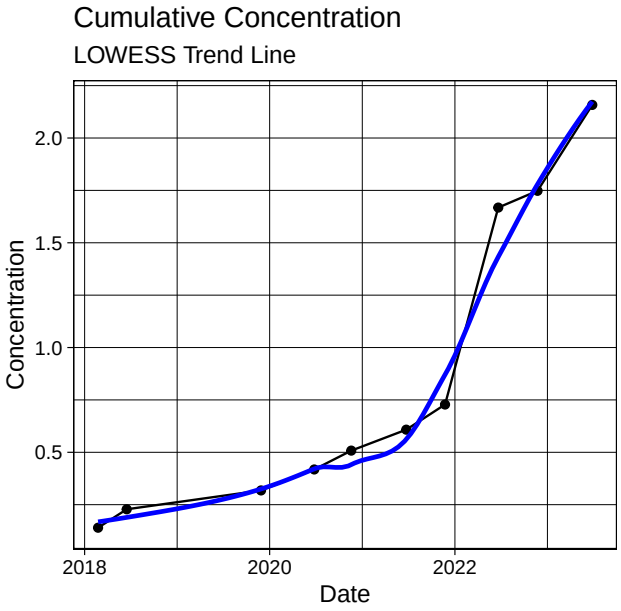




Kendall Trend Test Results Continuous	
n	10
z	0.9
p	0.37
S	11
varS	123
tau	0.25
mean	0.22
sd	0.27
cov	1.26
results	NO CLEAR TREND

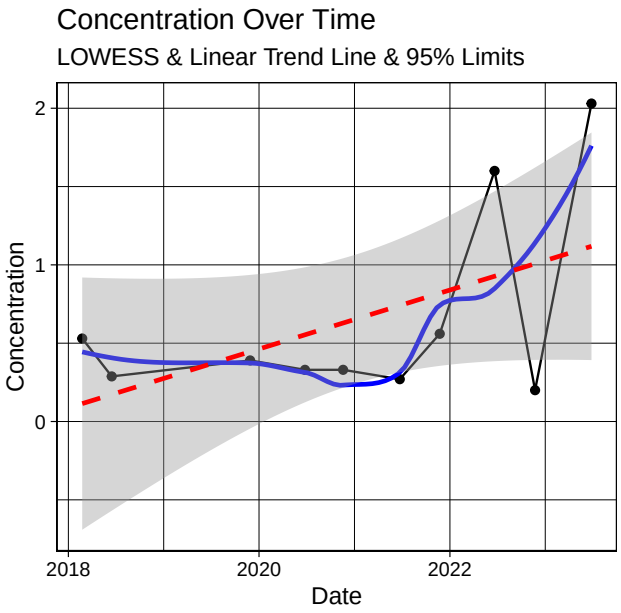
Report for ID : MW027 and Analyte : PFOS

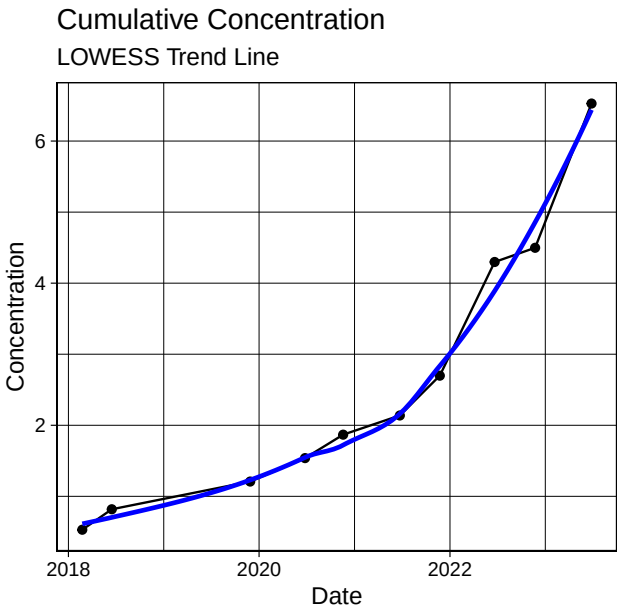




Kendall Trend Test Results Continuous	
n	10
z	0.45
p	0.65
S	6
varS	124
tau	0.13
mean	0.65
sd	0.63
cov	0.97
results	NO CLEAR TREND

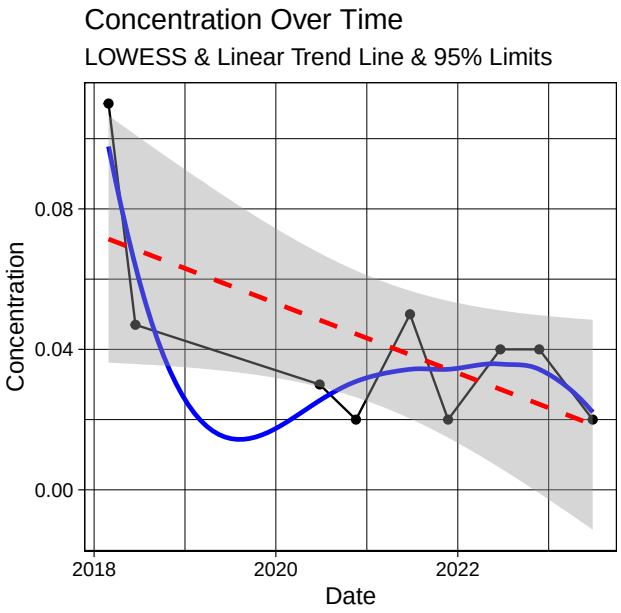
Report for ID : MW027 and Analyte : SumofPFOSandPFHxS

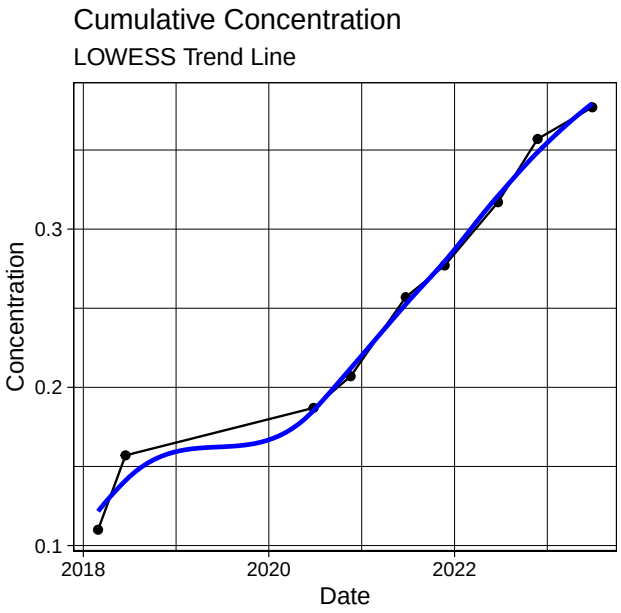




Kendall Trend Test Results Continuous	
n	9
z	-1.39
p	0.16
S	-14
varS	87.33
tau	-0.41
mean	0.04
sd	0.03
cov	0.67
results	STABLE

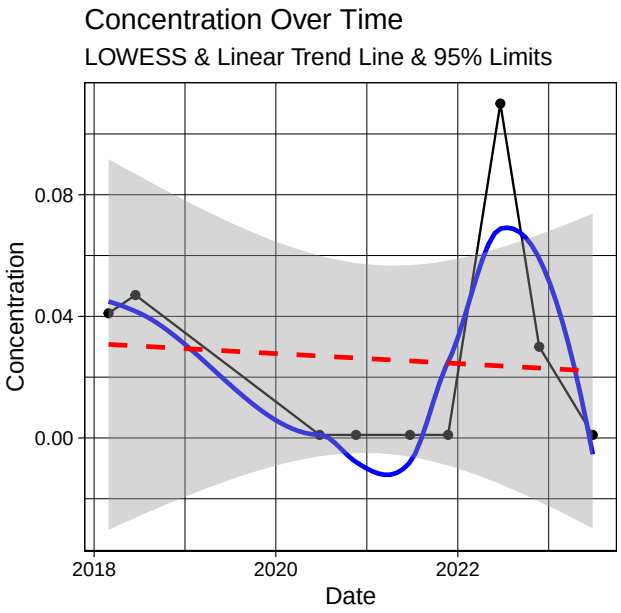
Report for ID : MW101 and Analyte : PFOA

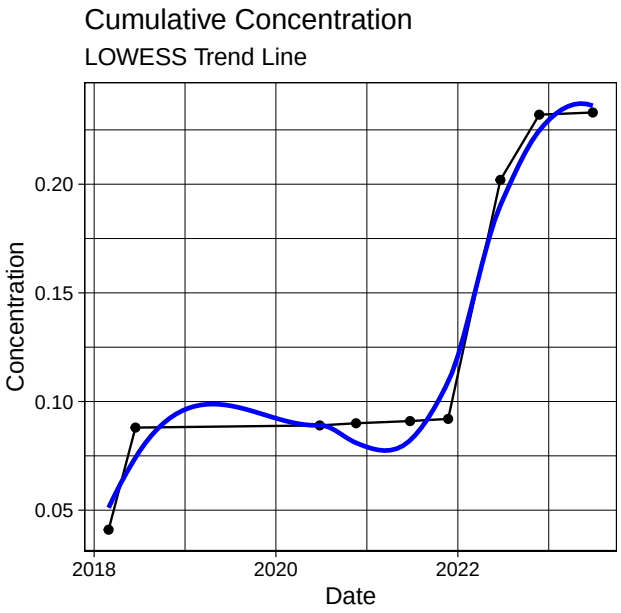




Kendall Trend Test Results Continuous	
n	9
z	-0.35
p	0.73
S	-4
varS	75.33
tau	-0.13
mean	0.03
sd	0.04
cov	1.42
results	NO CLEAR TREND

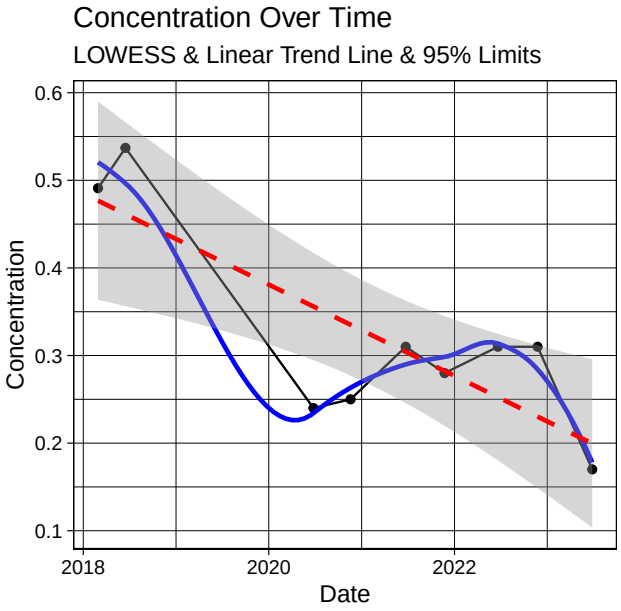
Report for ID : MW101 and Analyte : PFOS

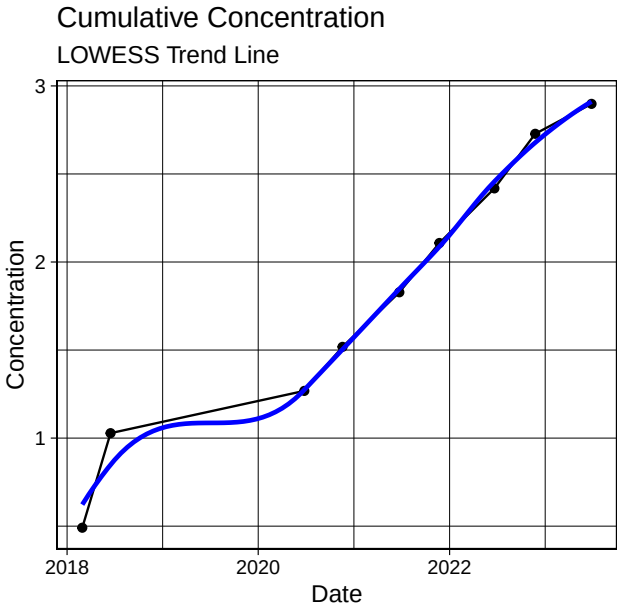




Kendall Trend Test Results Continuous	
n	9
z	-0.85
p	0.39
S	-9
varS	88.33
tau	-0.26
mean	0.32
sd	0.12
cov	0.37
results	STABLE

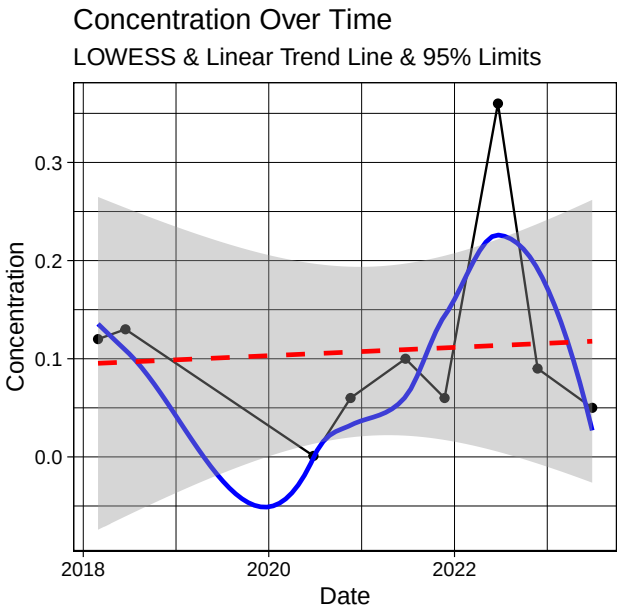
Report for ID : MW101 and Analyte : SumofPFOSandPFHxS

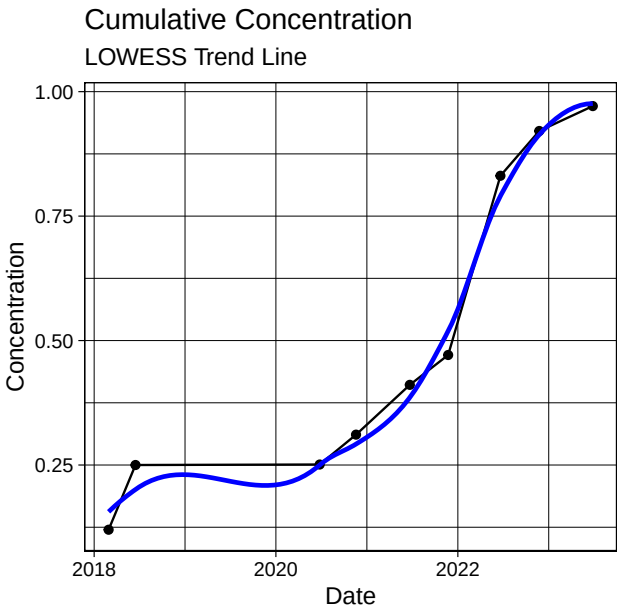




Kendall Trend Test Results Continuous	
n	9
z	-0.42
p	0.67
S	-5
varS	91
tau	-0.14
mean	0.11
sd	0.1
cov	0.95
results	STABLE

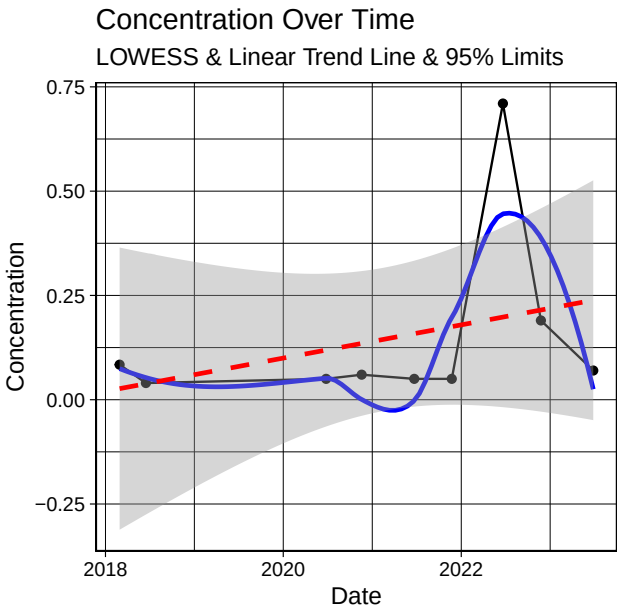
Report for ID : MW102 and Analyte : PFOA

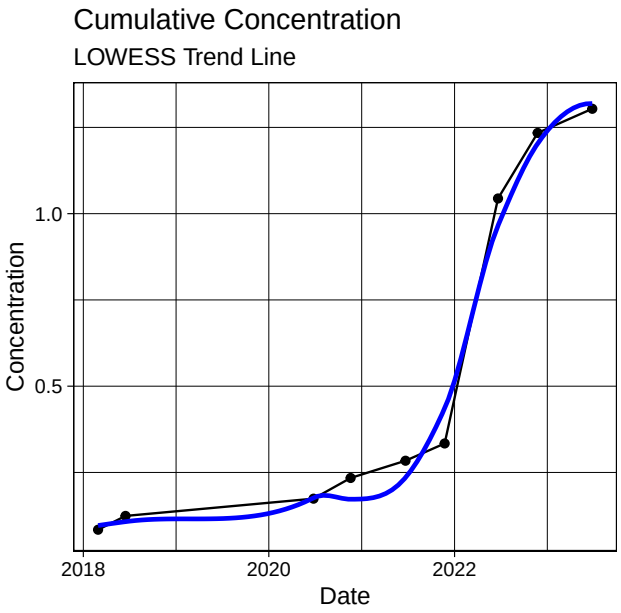




Kendall Trend Test Results Continuous	
n	9
z	1.06
p	0.29
S	11
varS	88.33
tau	0.32
mean	0.14
sd	0.22
cov	1.5
results	NO CLEAR TREND

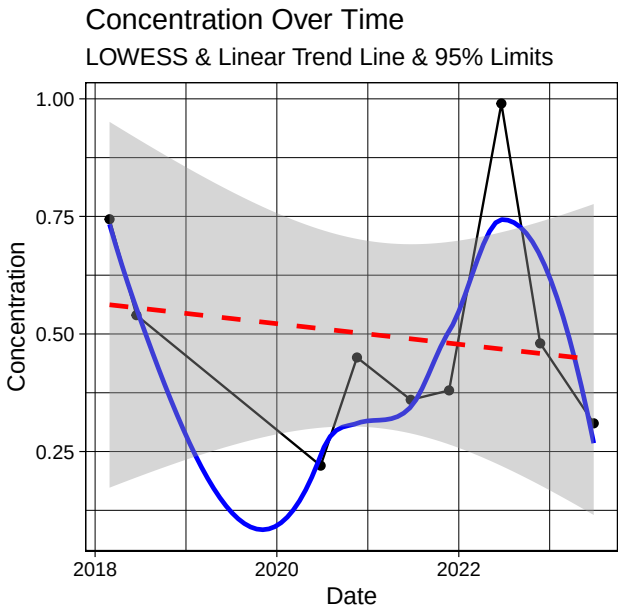
Report for ID : MW102 and Analyte : PFOS

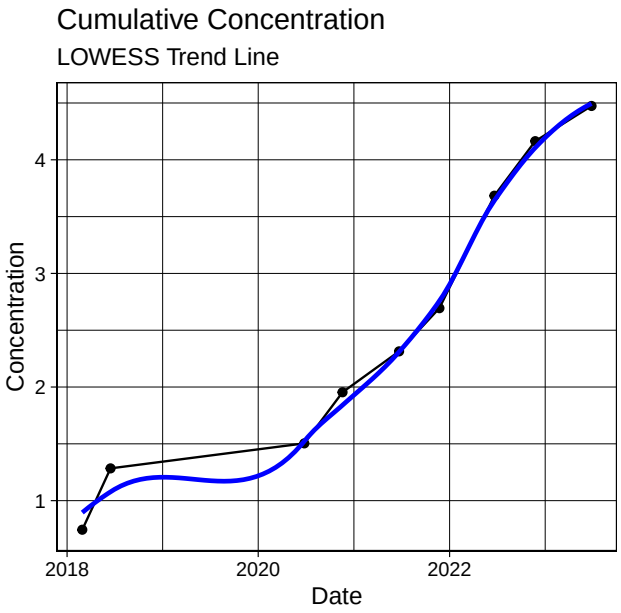




Kendall Trend Test Results Continuous	
n	9
z	-0.52
p	0.6
S	-6
varS	92
tau	-0.17
mean	0.5
sd	0.24
cov	0.48
results	STABLE

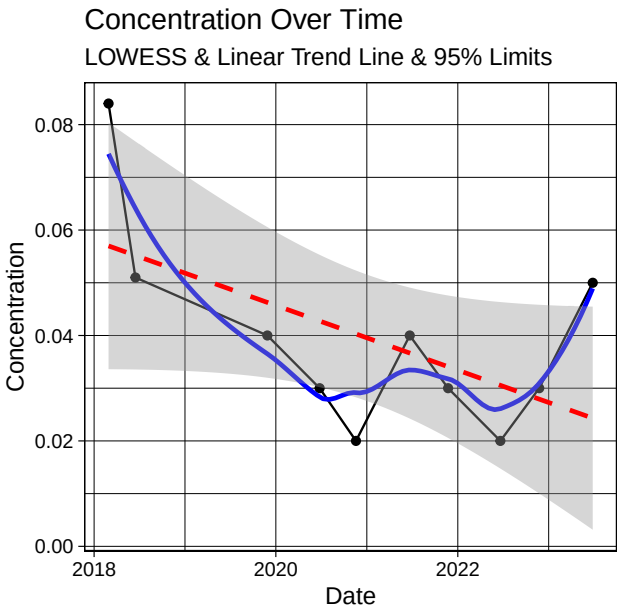
Report for ID : MW102 and Analyte : SumofPFOSandPFHxS

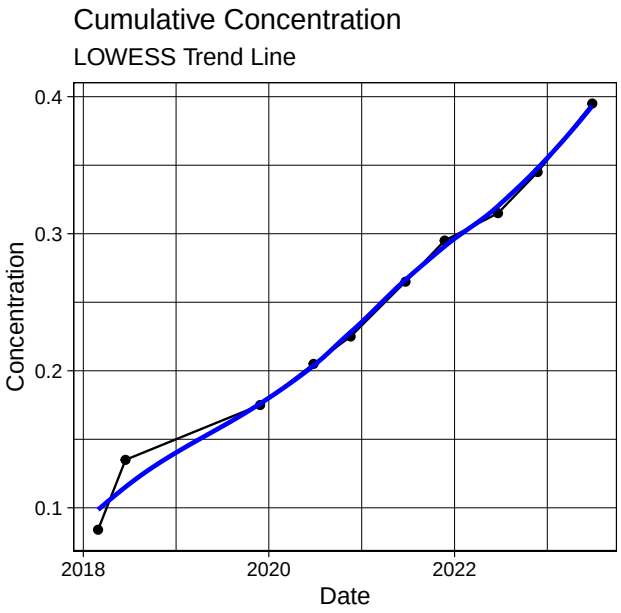




Kendall Trend Test Results Continuous	
n	10
z	-1.37
p	0.17
S	-16
varS	119.33
tau	-0.38
mean	0.04
sd	0.02
cov	0.48
results	STABLE

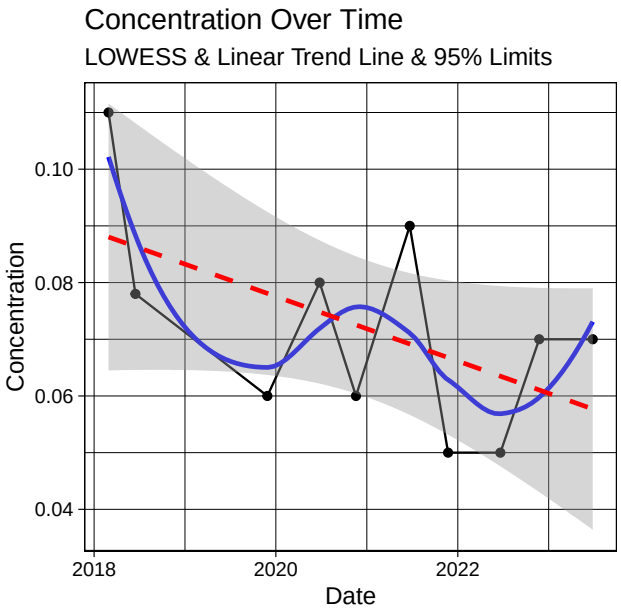
Report for ID : MW103 and Analyte : PFOA

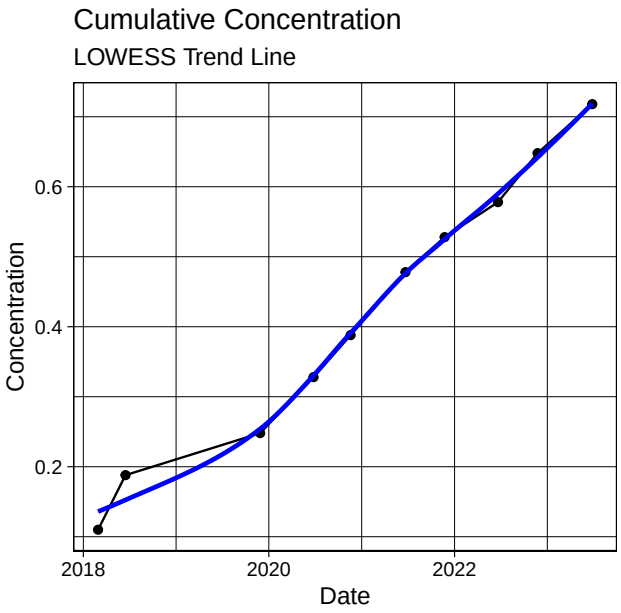




Kendall Trend Test Results Continuous	
n	10
z	-1.18
p	0.24
S	-14
varS	122
tau	-0.32
mean	0.07
sd	0.02
cov	0.26
results	STABLE

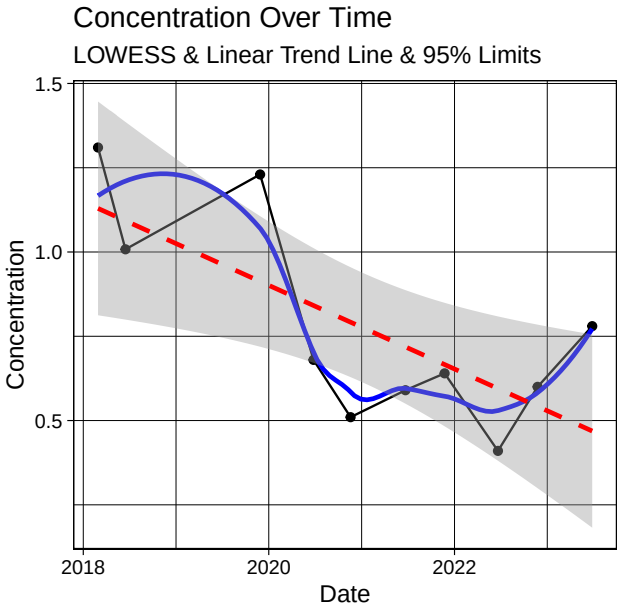
Report for ID : MW103 and Analyte : PFOS

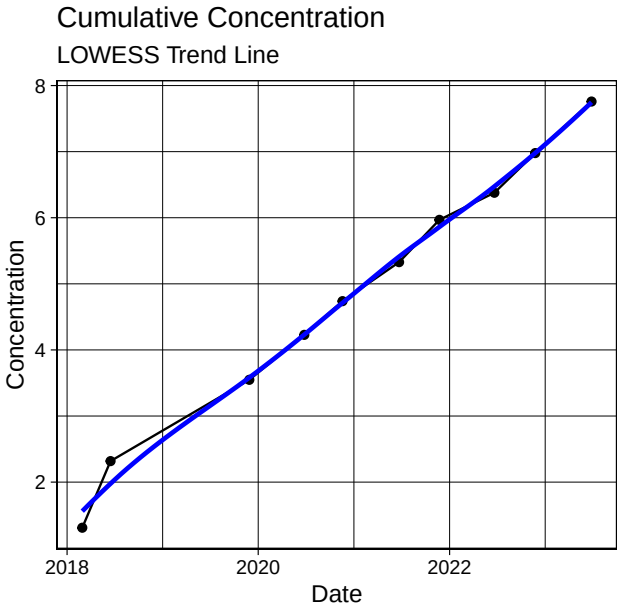




Kendall Trend Test Results Continuous	
n	10
z	-1.61
p	0.11
S	-19
varS	125
tau	-0.42
mean	0.78
sd	0.31
cov	0.39
results	STABLE

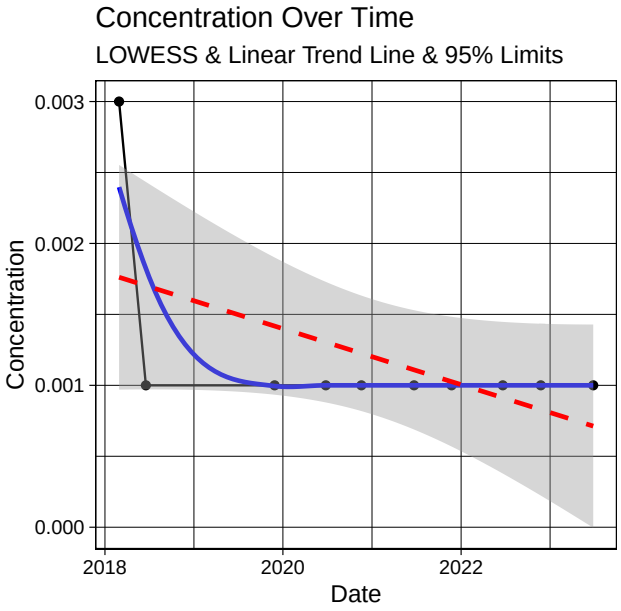
Report for ID : MW103 and Analyte : SumofPFOSandPFHxS

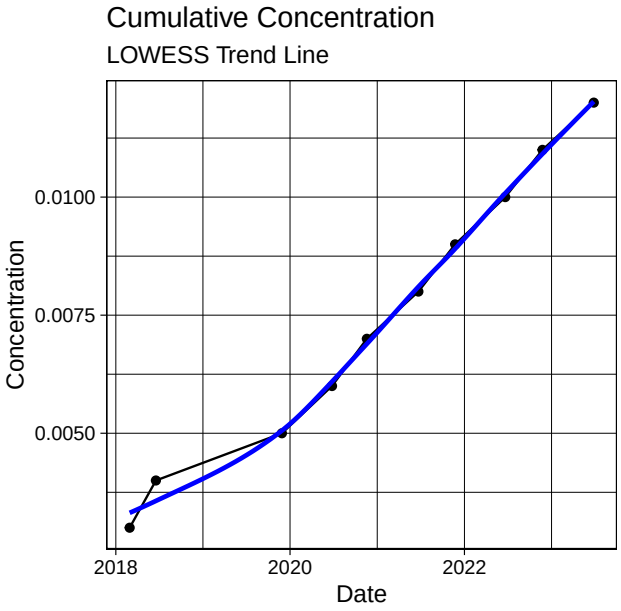




Kendall Trend Test Results Continuous	
n	10
z	-1.39
p	0.16
S	-9
varS	33
tau	-0.45
mean	0
sd	0
cov	0.53
results	STABLE

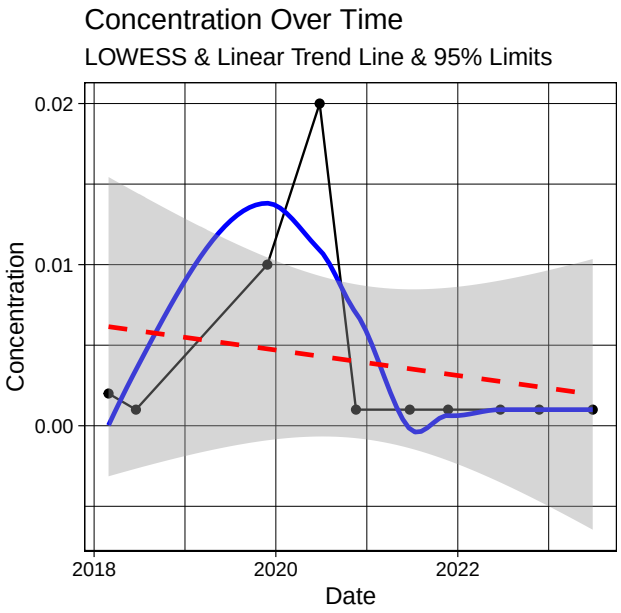
Report for ID : MW104 and Analyte : PFOA

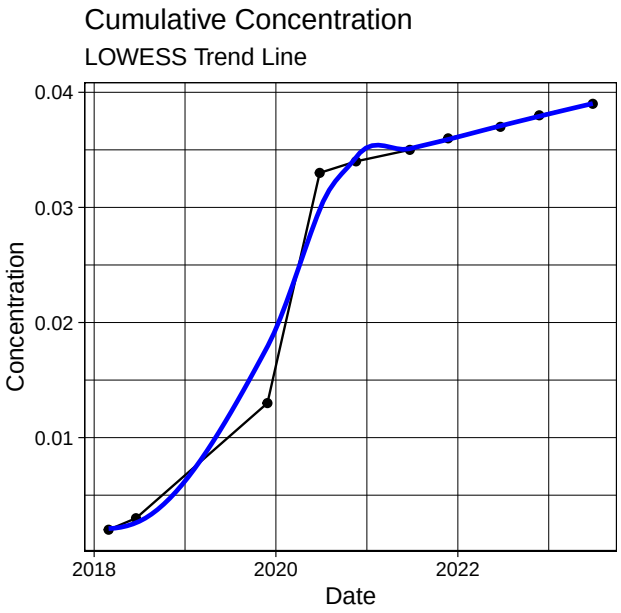




Kendall Trend Test Results Continuous	
n	10
z	-1.45
p	0.15
S	-14
varS	80.67
tau	-0.43
mean	0
sd	0.01
cov	1.62
results	NO CLEAR TREND

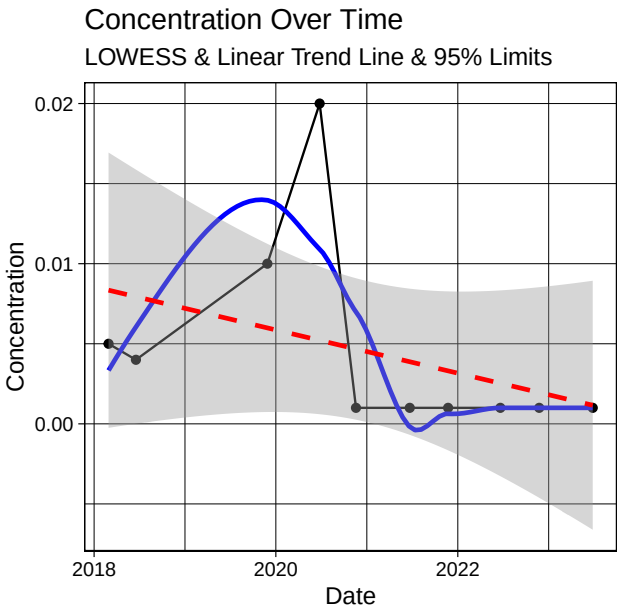
Report for ID : MW104 and Analyte : PFOS

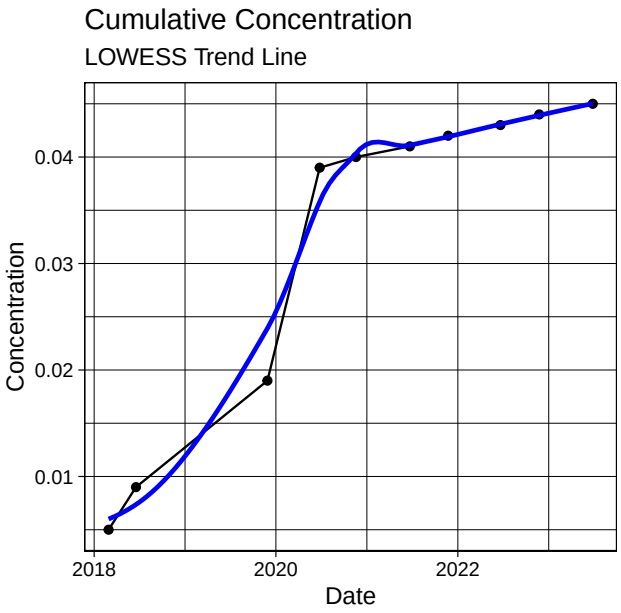




Kendall Trend Test Results Continuous	
n	10
z	-1.93
p	0.05
S	-20
varS	96.67
tau	-0.54
mean	0
sd	0.01
cov	1.37
results	POSSIBLY DECREASING

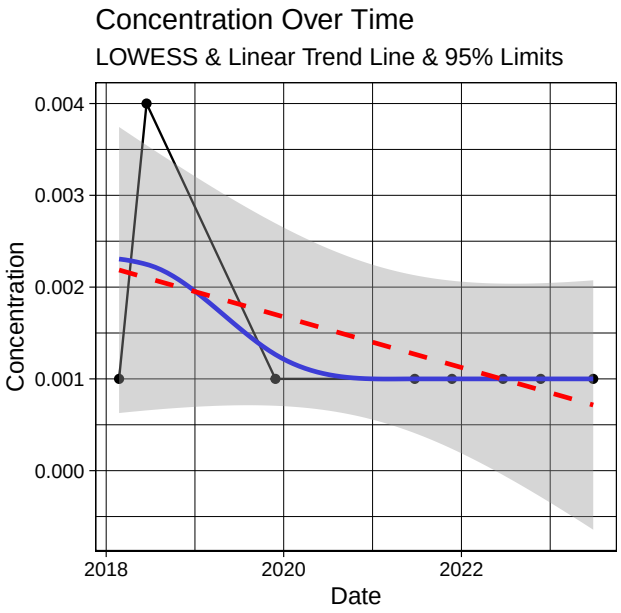
Report for ID : MW104 and Analyte : SumofPFOSandPFHxS

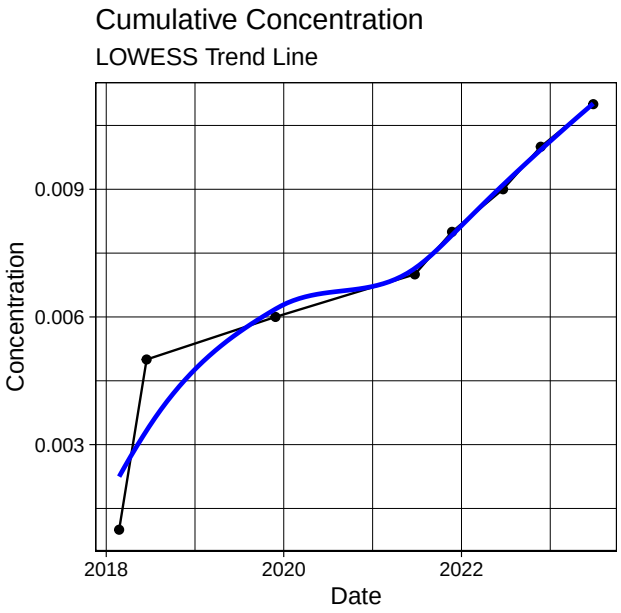




Kendall Trend Test Results Continuous	
n	8
z	-0.87
p	0.38
S	-5
varS	21
tau	-0.36
mean	0
sd	0
cov	0.77
results	STABLE

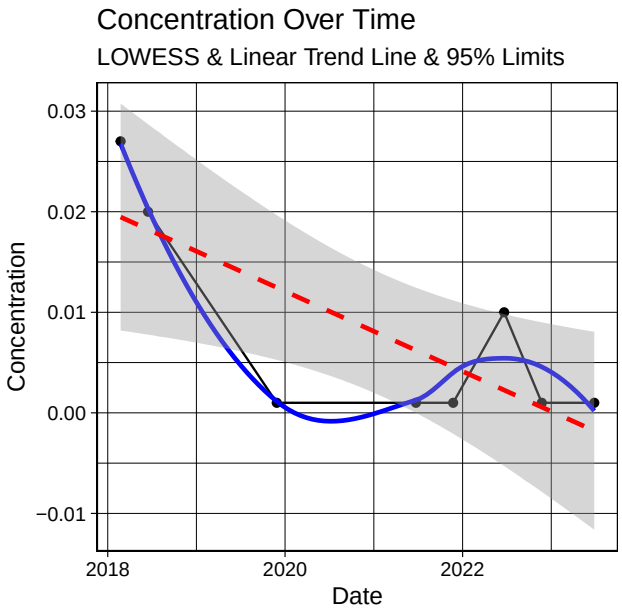
Report for ID : MW213 and Analyte : PFOA

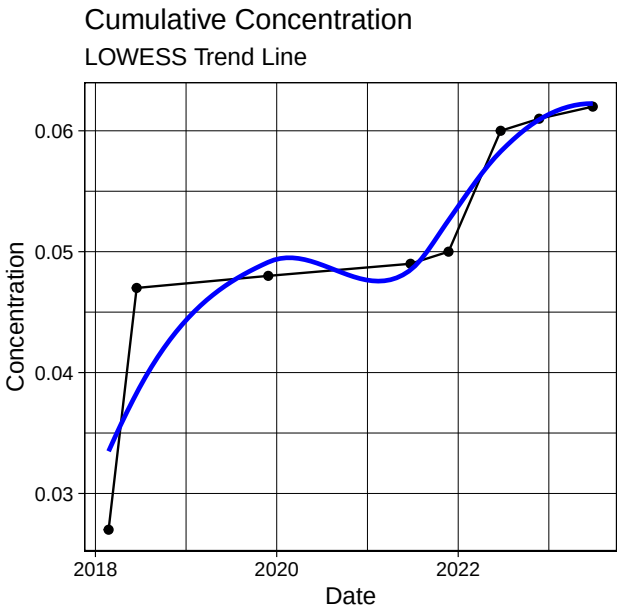




Kendall Trend Test Results Continuous	
n	8
z	-1.58
p	0.11
S	-12
varS	48.67
tau	-0.53
mean	0.01
sd	0.01
cov	1.34
results	NO CLEAR TREND

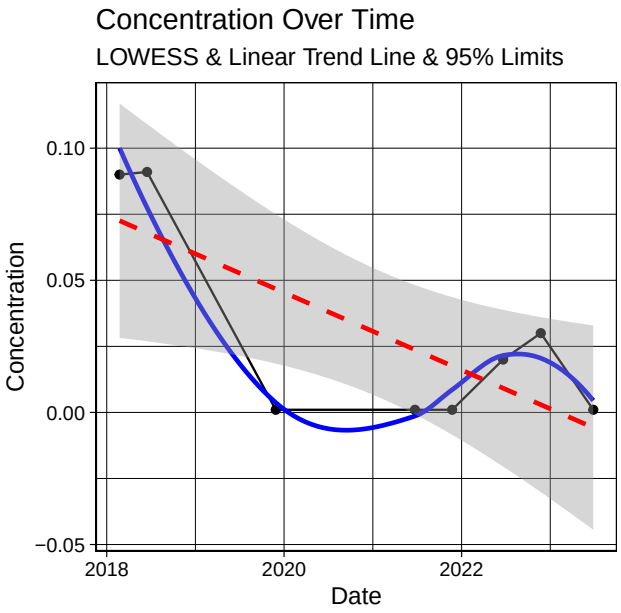
Report for ID : MW213 and Analyte : PFOS

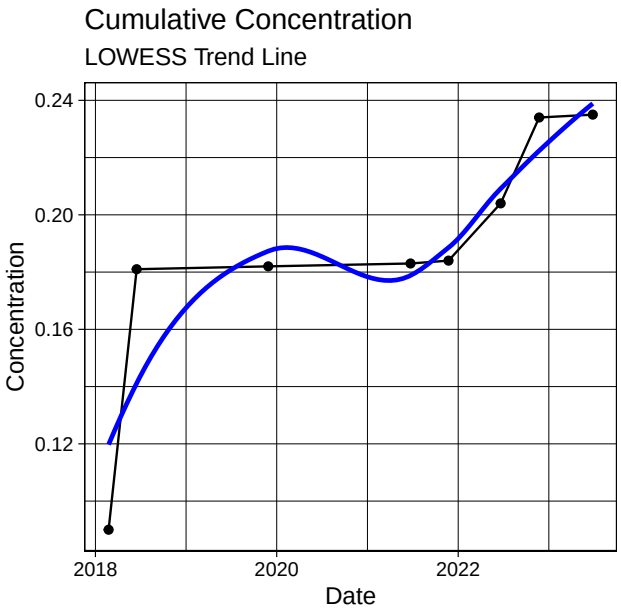




Kendall Trend Test Results Continuous	
n	8
z	-0.66
p	0.51
S	-6
varS	56.67
tau	-0.24
mean	0.03
sd	0.04
cov	1.34
results	NO CLEAR TREND

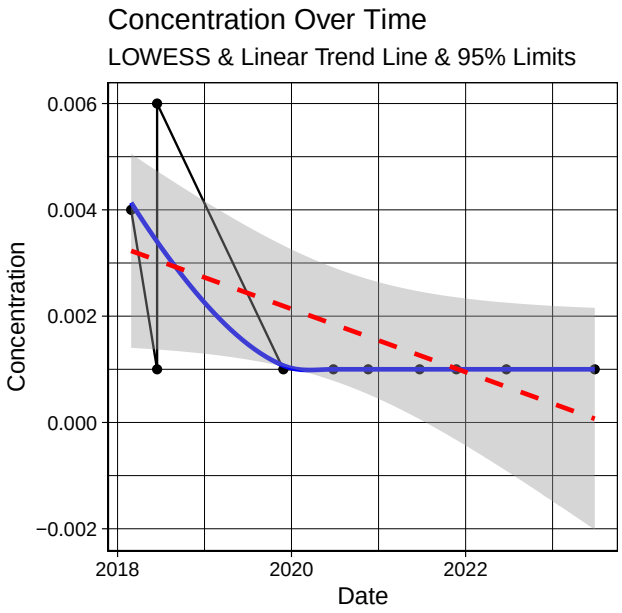
Report for ID : MW213 and Analyte : SumofPFOSandPFHxS

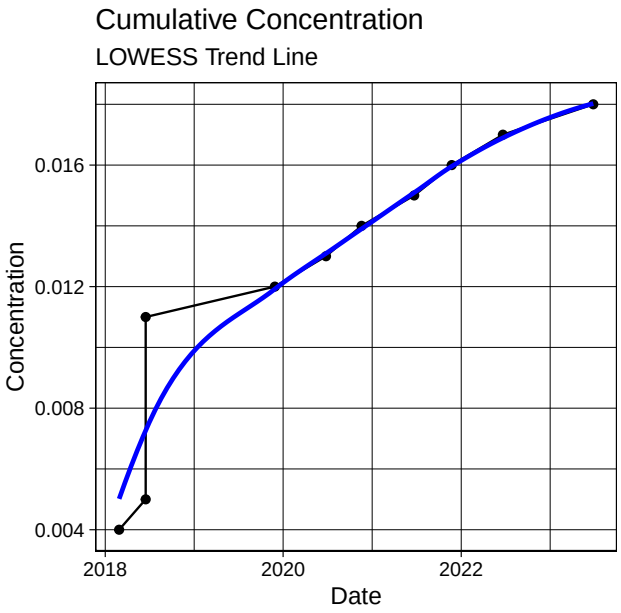




Kendall Trend Test Results Continuous	
n	10
z	-1.55
p	0.12
S	-13
varS	59.67
tau	-0.47
mean	0
sd	0
cov	0.97
results	STABLE

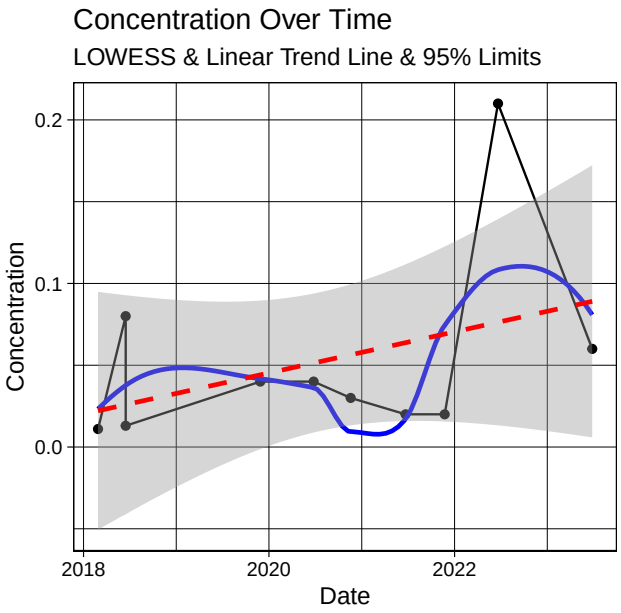
Report for ID : MW214 and Analyte : PFOA

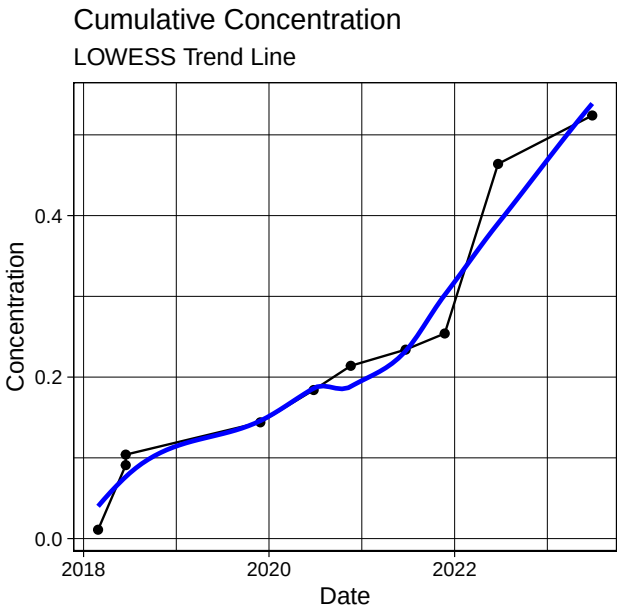




Kendall Trend Test Results Continuous	
n	10
z	0.9
p	0.37
S	11
varS	123
tau	0.25
mean	0.05
sd	0.06
cov	1.13
results	NO CLEAR TREND

Report for ID : MW214 and Analyte : PFOS





Kendall Trend Test Results Continuous	
n	10
z	1.08
p	0.28
S	13
varS	123
tau	0.3
mean	0.07
sd	0.06
cov	0.84
results	NO CLEAR TREND

Report for ID : MW214 and Analyte : SumofPFOSandPFHxS