Prepared for
Department of Defence
ABN: 68 706 814 312

AECOM

Ongoing Monitoring Report (November 2021 - March 2023)

PFAS OMP - Robertson Barracks

28-Feb-2024
PFAS Ongoing Monitoring Program NT & SA
Doc No. 60612561



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Client: Department of Defence
ABN: 68 706 814 312

Prepared by

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Job No.: 60612561

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document Ongoing Monitoring Report (November 2021 - March 2023)

Ref 20240209_OMP1200_ROB_OMR_2023_Rev0_Post Director Review.docx

Date 28-Feb-2024

Prepared by [redacted]

Reviewed by [redacted]

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	28-Feb-2024	Final	[redacted]	[redacted]

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Executive summary

Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) outlined in the PFAS Management Area Plan (PMAP) (Defence, 2018) at Robertson Barracks (the Base) (Site ID 1200), Northern Territory (NT) (**Figure F1** in **Appendix A**).

Objective

The overarching objective of implementing the OMP is to provide information on changes in the location and concentrations of PFAS on-base and off-base within the Monitoring Area compared to conditions described in the Detailed Site Investigation (DSI) (Senversa, 2018a). The Monitoring Area comprises the Base (Robertson Barracks) and off-Base, within the southern drainage channel running along southern boundary of the Base and a portion of the Close Training Area (CTA).

The data is used to assist risk management decisions by Defence to protect human health and the environment, and to inform the understanding of the effectiveness of remedial actions.

Monitoring program

AECOM completed periodic monitoring of groundwater, surface water and sediment between November 2021 and March 2023 in general accordance with the Sampling and Analysis Quality Plan (SAQP) developed by AECOM (AECOM, 2022a).

The monitoring program targeted PFAS and included selected groundwater, surface water and sediment monitoring locations on-Base and off-Base within the Monitoring Area. Although outside the Monitoring Area, the monitoring also included groundwater bores within Shoal Bay Receiving Station (SBRS). Refer to **Figure F2** in **Appendix A**.

Groundwater results

Groundwater level monitoring data indicated that groundwater in the shallow groundwater aquifer[1] (upper portion of Bathurst Island Formation within the Monitoring Area generally flows north-east from the Base towards Milners Creek and Shoal Bay. Groundwater elevations appeared to vary between season at most monitoring locations (higher in wet season, lower in dry season). This is consistent with previous observations.

Overall, the groundwater monitoring results do not suggest a change in the understanding of contamination. The PFAS plume extents in groundwater were generally similar to that which was presented in the 2018 DSI (Senversa, 2018a). The following was observed:

- PFAS concentrations are highest on-Base in wells in the vicinity of Source Area 1 and Source Areas 2 and 3. The observed increased PFAS concentrations from Source Areas 2 and 3 (MW004), while notable, are not significant and do not change the overall site risk profile.
- The Sum of Perfluorooctane sulfonate and Perfluorohexane sulfonate (PFOS+PFHxS) concentrations in groundwater exceeded the adopted human health-based guidance value for drinking water in on-Base wells MW066 (Source Area 1), MW004 (Source Area 2), MW034 (northern monitoring well) and MW001 (southern monitoring well), and off-Base wells MW032 (northern monitoring well) and MW030 (southern monitoring well).
- PFAS concentrations in some locations (MW004, MW030, MW031) were reported above the historical range in the monitoring period, however PFAS concentrations were generally of the same order of magnitude as historical results. Subsequent monitoring events were completed (MW004 and MW030 only) reporting concentrations to be back within historical range.
- Concentrations of PFAS in groundwater indicated generally stable or inconclusive trends. Increasing trends were limited to two locations, namely northern monitoring wells MW034 and

[1] An aquifer is an underground layer of porous and permeable rock, gravel, sand or silt, which can contain or transmit groundwater that lies within the geology below the soil surface.

MW032, located on-Base and off-Base (respectively). However, concentrations at these two locations are close to the laboratory detection limits and marginally above the adopted human health-based guidance value for drinking water. Further data is required to understand temporal changes at these two locations.

Surface water results

PFAS concentrations in surface water at locations on-Base and off-Base were generally consistent with historical results. The following was observed:

- All surface water sample locations reported concentrations of PFOS+PFHxS below the adopted PFAS Recreational Water guidelines (HEPA, 2020).
- PFOS concentrations exceeding the 99% freshwater ecological criteria (HEPA, 2020) were detected in all on-Base and off-Base locations during the monitoring period, with the exception of SW023. The 99% protection level is applied to account for bioaccumulative effects that may manifest over time within the localised food chain. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) recommends a conservative approach of applying lower guideline values for bioaccumulative toxicants such as PFOS.
- PFAS concentrations in some locations (SW007 and SW123) were reported above the historical range in the monitoring period, however PFAS concentrations were generally of the same order of magnitude as historical results, close to the laboratory detection limit and below the adopted PFAS Recreational Water guidelines (HEPA, 2020).
- Reported PFAS concentrations within on-Base and off-Base surface water sampling locations remained stable.

Sediment results

PFAS concentrations in sediment at all locations both on- and off-Base were primarily within historical ranges and were mostly close to or below the PFAS laboratory detection limit.

PFAS concentrations in SD059 and SD086 exceeded historical range, however PFAS concentrations were within the same order of magnitude as previous historical results.

Sediment sampling was removed from the OMP in the 2023 version (Defence, 2023) and subsequently removed from the sampling program. It was determined that sufficient sediment data was collected to determine that PFAS in sediment was not a significant contributor to PFAS movement from on-Base to off-Base areas.

Interpretive analysis

Data collected during the monitoring period were compared to historical (previous) data for the sampling locations.

PFAS concentrations within on-Base and off-Base groundwater were generally within the same order of magnitude as historical results and within the identified groundwater plume[2].

PFAS concentrations were generally lower at off-Base locations than PFAS concentrations observed at on-Base locations, consistent with previous results.

Statistical analysis of the monitoring results for groundwater locations suggests that PFAS concentrations were generally stable within the Monitoring Area.

What is an 'order of magnitude'?

This refers to a number 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.

[2] PFAS contaminant plumes are areas of groundwater with elevated PFAS concentrations that are slowly moving from the source areas in the same direction that the groundwater flows.

Variation in PFAS concentrations were observed and likely due to the seasonal variability of Darwin's wet and dry seasons.

CSM and risk profile

The conceptual site model (CSM) was reviewed in light of the monitoring data collected during the current monitoring period between November 2021 and March 2023, and no changes were identified to sources, pathways or receptors at the base or within the Monitoring Area that would require an update to the CSM as described in the PMAP. The findings of the interpretive analysis conducted for the monitoring period are considered consistent with the risk profile for the Monitoring Area.

The results collected during the monitoring period were compared to screening criteria utilised in the Human Health and Ecological Risk Assessment (HHERA) (Senversa, 2018b). Locations in which results were outside the historical ranges were within the assessment criteria ranges in the HHERA (Senversa, 2018b), and therefore the data collected during the current monitoring period are considered consistent with the findings of the HHERA.

Conclusions

The following conclusions are based on the data collected during the monitoring period:

- The results for the monitoring period indicate that the nature and extent of PFAS in groundwater, surface water and sediment are consistent with previous findings.
- The CSM was reviewed, and based on the results presented within this report, no changes were identified to source, pathway or the type of receptors at the base and within the Monitoring Area.
- Based on the data collected during the monitoring period, no changes to the risk profile were identified within the Monitoring Area.
- The sampling conducted over the monitoring period is considered to have met the objectives of the OMP and was carried out in general accordance with the SAQP.

Given the remaining PFAS concentrations at the on-Base source areas, it is recommended that monitoring of groundwater and surface water is continued to understand the extent of PFAS, potential migration and any associated risk changes.

Abbreviations and acronyms

Abbreviation/ Acronym	Term
ADWG	Australian Drinking Water Guidelines
AECOM	AECOM Australia Pty Ltd
AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
BOM	Bureau of Meteorology
CSM	Conceptual Site Model
CTA	Close Training Area
DO	Dissolved Oxygen
Defence	Department of Defence
DCMM	Defence Contamination Management Manual
DSI	Detailed Site Investigation
EC	Electrical Conductivity
ERS	Emergency Response Squadron
FSANZ	Food Standards Australia New Zealand
GWE	Groundwater Elevation
HEPA	Heads of Environment Protection Authority
HHERA	Human Health and Ecological Risk Assessment
LOR	Limit of Reporting
MK	Mann-Kendall
MTR	Marksmanship Training Range
MW	Monitoring Well
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NT	Northern Territory
NEMP	National Environmental Management Plan
OMP	Ongoing Monitoring Plan
ORP	Oxidation Reduction Potential
PFAS	Per- and poly-fluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFHxS	Perfluorohexane sulfonate
PMAP	PFAS Management Area Plan
QA/QC	Quality Assurance and Quality Control

Abbreviation/ Acronym	Term
SAQP	Sampling and Analysis Quality Plan
SBRS	Shoal Bay Receiving Station
SD	Sediment
SW	Surface Water
SWL	Surface Water Level

List of units

Unit	Definition
cm	centimetre
°C	degrees Celsius
g	grams
km	Kilometre
L	litre
ML	Megalitre
m	metre
mbtoc	metres below top of casing
m bgl	metres below ground level
µg	micrograms
µS	microsiemens
mg	milligrams
mV	millivolts
NTU	Nephelometric Turbidity Unit

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) at Robertson Barracks (the Base), Northern Territory (NT) (**Figure F1** in **Appendix A**).

The monitoring targeted PFAS and included selected locations within the Monitoring Area, comprising on-Base, southern drainage channel running along the southern boundary of the Base and a portion of the Close Training Area (CTA). The monitoring also included bores within Shoal Bay Receiving Station (SBRS). Refer to **Figure F2** in **Appendix A**. These locations were identified in the OMP (Defence, 2018).

In order to meet the objectives of the OMP, the monitoring was undertaken in accordance with the *Sampling and Analysis Quality Plan* (SAQP) (AECOM, 2022a). Note that the SAQP is generally updated prior to each monitoring event.

This report has been prepared in accordance with the Defence *PFAS OMP Annual Interpretive Report Guidance Version 0.4* (Defence, 2022) and summarises monitoring data collected between November 2021 and March 2023 (the 'monitoring period').

1.1 Purpose and objectives

The objective of the monitoring program set out in the OMP (Defence, 2018) is to provide information on changes in location and concentrations of PFAS within the Monitoring Area.

Assessing changes in the distribution, concentration, and transport (pathways and flow rates) of the contaminants against appropriate guideline values provides an:

- evidence-based approach for targeted and effective risk management decision making to protect human health and environmental receptors; and
- early warning that additional management of PFAS contamination may be warranted in areas not currently understood to be affected by PFAS.

The data will be evaluated to assess environmental variability and trends in PFAS concentrations and changes to the known risk profile as described in the DSI (Senversa, 2018a), and to inform recommendations for triggers to review the OMP (Defence, 2018) or the PFAS Management Area Plan (PMAP) (Defence, 2018) or any requirements to update the Human Health and Ecological Risk Assessment (HHERA) (Senversa, 2018b) documentation, if required.

1.2 Scope

The scope of works for this ongoing monitoring report included assessing changes to the nature and extent of PFAS during the monitoring period, in additional to interim monitoring data and historical OMP investigations and evaluating if these changes have implications for the understanding of the Conceptual Site Model (CSM) and the risk profile with respect to PFAS impacts at the base. This assessment included the evaluation of data reported in the following factual reports, as well as other data provided by Defence and ancillary external data sources:

- *Robertson Barracks – Sampling Event Factual Report, November 2021* (AECOM, 2022b).
- *Robertson Barracks – Wet Season Sampling Event Factual Report 2022* (AECOM, 2023a)
- *Robertson Barracks – Sampling Event Factual Report, End of Dry Season 2022* (AECOM, 2023b)
- *Robertson Barracks – Wet Season Sampling Event Factual Report 2023* (AECOM, 2023c)

In addition to the above reports pertaining to the monitoring period, the following historical documents were also considered:

- *Robertson Barracks – PFAS OMP Interpretive Report 2020* (AECOM, 2021a) (2020 AIR)
- *Robertson Barracks – PFAS OMP Interpretive Report 2021* (AECOM, 2022c) (2021 AIR)

- *Robertson Barracks – Ongoing Monitoring Report – October 2018 to May 2019* (Senversa, 2019)Robertson Barracks – Detailed Site Inspection 2018 ((Senversa, 2018a) (2018 DSI)

Ancillary external data sources included meteorological data (see **Section 6.4**).

2.0 Site setting

2.1 Site identification

The site identification and setting are summarised in **Table 1**, below as presented in the PMAP (Defence, 2018).

Table 1 Site identification and setting summary

Element	Description
Site ID	1200
Location	The Base is located approximately 17 km east of Darwin city centre. The area surrounding the Base contains predominantly semi-rural residential land uses, with open wetland and swamp areas as well as multiple quarrying areas including within the CTA located to the east of the Base as shown in **Figure F1** in **Appendix A**.
Regional climate	The base and surrounds lie within the monsoonal tropic area of northern Australia. The area experiences two distinct seasons, a warm dry season from approximately May to September and a hot, monsoon and tropical cyclone wet season from approximately October to April. Rainfall occurs predominantly during the wet season. Significant monsoon and tropical cyclone events during January to March are relatively common, occurring throughout the wet season and are likely to cause localised flooding. Darwin has an annual average rainfall of 1,725 millimetres (mm) (Bureau of Meteorology [BOM], 2023).
Topography, geology and hydrogeology	The Base and surrounds are slightly undulating and low lying with wetlands and swamps sloping towards the east, with the elevation ranging from approximately 37 metres Australian Height Datum (m AHD) in the north-west to 19 m AHD in the north-east. The surrounding area slopes to the north-east towards Shoal Bay. The area is generally underlain by the Bathurst Island Formation which overlies the Wildman Siltstone Formation with the exception of an outcrop of the Acacia Gap Quartzite Member located within the CTA. The nature of each of these formations is summarised below: • Bathurst Island Formation typically comprises radiolarian claystone, sandy claystone, clayey sandstone, quartz sandstone, glauconitic sandstone and basal conglomerate up to 50 m in thickness. • Wildman Siltstone Formation comprises siltstone, silty sandstone and minor quartzite encountered between 50 m to over 1,000 metres below ground level (m bgl). • Acacia Gap Quartzite Member comprises quartzite, commonly pyritic sandstone with interbedded siltstone. The geology encountered during the DSI generally comprised sandy silt or silty sand overlying siltstone. Fill material was observed at several locations within the CTA at locations previously mined and at several locations within the Base, generally associated with grass cover or below concrete and paving. The upper water table aquifers of the Bathurst Island Formation are discontinuous and unconfined, occurring as localised aquifers within the

Element	Description
	surface fluvial sand, silts and gravel beds of these predominantly fine sediment dominated units. Groundwater levels in the upper water table aquifer recorded during the DSI ranged between the ground surface during the wet season and approximately 10 m bgl during the dry season. The aquifer is recharged during the wet season by infiltration of rain and flood water and river leakage with seasonal variations of up to 9.3 m reported between the dry and wet seasons in the Marksmanship Training Range (MTR). In some areas, it is likely that the upper aquifer discharges to rivers, and the pattern of recharge and discharge relationships between the upper aquifers and rivers is in many areas, seasonal. Groundwater levels noted from monitoring wells installed within the lower aquifer of the Bathurst Island Formation ranged between approximately 27 and 30 m bgl, as well as approximately 1.4 and 7 m bgl suggesting a semi-confined aquifer system is also present. Vertical hydraulic gradient values between 'shallow' and 'deep' well pairs were minimal at two paired monitoring locations with a downward vertical gradient evident at one paired location which indicated that the two aquifers are likely to be hydraulically connected. Groundwater flow direction in the northern and central portions of the Base is inferred to the east-north-east. Groundwater flow direction in the southern portion of the Base is inferred to the south-south-east and is likely to be influenced by the southern drainage channel leading into Milners Creek. Groundwater hydraulic gradients reported for the wet season compared to the dry season were relatively similar, ranging between 0.011 and 0.014. This suggests that groundwater recharge to the underlying aquifers is relatively uniform across the Base and surrounds with no evidence of preferential recharge zones. The average calculated seepage velocities vary by an order of magnitude between the upper (silt) aquifer (from 46 m/year in the dry season to 77 m/year in the wet season) and the lower (siltstone) aquifer (approximately 2 m/year). As a result of the difference in surface topography between the Base and the CTA, groundwater was generally encountered at shallower depths within the CTA. In some areas of Milners Creek, including in the south of the CTA and immediately adjacent to the east of the Base, the creek channel is shallow and not likely to be in hydraulic continuity with groundwater during the dry season until further down-gradient closer to Milners Swamp. During the wet season, however, groundwater levels rose almost to the ground surface within the CTA in proximity of Milners Creek as well as above the drainage lines in some areas within the Base with groundwater and surface water both contributing to areas of high water flow and/or areas of inundation.

Element	Description
Surface water drainage	The Base is located in the Kings Creek Catchment, which flows north out into Shoal Bay, located north-east of Darwin Harbour. The Base is situated partly on a wetland area which extends to the west of the Base and drains south along the western boundary into the southern drainage channel which discharges into Milners Creek, an intermittent creek which flows north into Milners Swamp. Flow from Milners Swamp then moves into Kings Creek which in part transitions through the Noogoo Swamp before entering Shoal Bay. There are two surface water features in low lying areas, present in the north-eastern and western portions of the Base that are likely to collect surface water run-off during high rainfall events. These features are likely to be associated with former water courses such as creeks and swamp systems. The swamp area along the western portion of the Base is predominantly inundated while the north-eastern area becomes inundated during high rainfall events. There are several lined and unlined drains located within the Base that generally follow the local topography and divert surface runoff through and off the Base. Generally, surface water diverts around the Base and runs around the perimeter in open channels before discharging along points on the eastern, western, and southern boundaries. The drainage lines in the southern portion of the Base discharge to the unlined southern drainage channel which is located outside of the Base and runs parallel to the southern boundary. This channel discharges into the southern tributary of Milners Creek which flows northwards through the CTA. The drainage lines in the central portion of the Base discharge to a drain that runs underneath Thorngate Road to the east and into the western tributary of Milners Creek. The two tributaries of the Milners Creek system converge within the CTA with the creek then flowing to the north-east and to the area known as Milners Swamp. These two tributaries of Milners Creek are ephemeral in places dependent on recent rainfall events and groundwater levels. Various man-made lakes are scattered across the CTA from historical quarrying activities. The water from these lakes is not used for any purpose by Defence, however, may be used by ecological receptors, particularly birds.
Vegetation	The Base and surrounds include both developed and undeveloped land areas that include fields, streams, wetlands, and forested areas.
Current land use	The Base is the home of Australia's 1st Brigade whose mission is to provide forces to conduct full-spectrum operations in order to defend Australia and its national interests. Over 2,600 staff work daily at the Base, with the addition of staff from the United States Marine Corp during the dry season. The current layout and key features include: • Helicopter airfield and infrastructure in the northern portion of the Base, including hangars, vehicle and aircraft maintenance areas, and fuel supply infrastructure. • Commercial/office buildings across the Base. • Residential housing for personnel, sports and recreational facilities and a childcare centre (used four days a week as a minimum by mothers and toddlers) in the central eastern section of the Base. • Four main catering kitchens and recreational facilities, including gyms, swimming pools, children's play parks, cafes and a chapel. • Training areas, including shooting ranges and revetments in the cleared open space to the north of the Base known as the MTR.

Element	Description
	• The CTA which is a former quarry area to the east of the Base has also recently been acquired by Defence and is currently being developed for the use of live fire range field training. As part of the proposed development of the CTA, fencing and gated access will be installed around the perimeter of the CTA to restrict access to the public who can currently access some areas of the CTA. • Sports fields, ovals and activity areas located along the south-eastern section of the Base. The surrounding land use is predominantly Commonwealth owned, with no privately-owned rural residential homes within a 1 km radius of the Base. Identified land uses in each direction from the Base are summarised below: • **North:** The SBRS is located to the north. This area predominantly comprises open woodlands, wetlands and swamps overlying an undulating topography. The littoral and marine zones of Shoal Bay lie immediately north of the SBRS. • **East:** To the east and north-east are former quarries that have been utilised for sand and gravel extraction and are now filled with water. Defence now manages the land which is Commonwealth owned and is in the process of transforming the area into a CTA. The CTA also includes Milners Creek which continues into Milners Swamp and Noogoo Swamp. Further to the east is the Darwin Correctional Facility. The flooded quarries and Milners Creek are located within the CTA with restricted access to the public, however, recreational fishing may occur in Milners Creek outside of the CTA and from the southern drainage channel which are accessible to the public. • **South:** Small woodland open reserve area, light industrial, commercial retail, office facilities and the Stuart Highway. • **West:** Open woodlands, tall shrubland, plains and swamps as well as an area managed by Airservices (not related to fire training exercises). Further west are semi-rural residential dwellings and Knuckey Lagoons Conservation Reserve.

2.2 Monitoring area

The location of the Base and the Monitoring Area is shown in **Figure F1** (**Appendix A**). The Monitoring Area comprises the following three areas:

- The Base
- The southern drainage channel running along the southern boundary of the Barracks which discharges to Milners Creek. Concentrations of PFAS above ecological screening levels have been identified in both the southern drainage channel and Milners Creek
- A portion of the western part of the CTA to monitor potential lateral migration of PFAS impacted groundwater and surface water from the Base.

Although outside the Monitoring Area, the monitoring also includes two groundwater abstraction bores used for potable purposes at the SBRS (refer to **Figure F2** in **Appendix A**). These two bores were tested as part of the DSI as the SBRS is operated by Defence and were included as part of ongoing monitoring despite no previous detections of PFAS.

2.3 Source areas

The PMAP (Defence, 2018) identified the following locations as PFAS source areas, illustrated in **Figure F1** (**Appendix A**):

- **Source Area 1**: The former Emergency Response Squadron (ERS) compound comprising Building 137 and immediate surrounds
- **Source Area 2**: 17 Combat Service Support Brigade Elements where the ERS parked their trucks prior to moving to Building 137
- **Source Area 3**: Wash down bays and refuelling within the southern portion of the Base. The drainage network also culminates in this area of the Base.

3.0 Sampling and analytical methodology

3.1 Sampling location rationale and methodology

The SAQP (AECOM, 2022a) (**Appendix C**) provides the sampling schedule and rationale, prescribing biannual groundwater sampling, biannual surface water sampling, and annual sediment sampling, during the monitoring period. This involved:

- A broad sampling and analysis event for the collection of groundwater samples occurring on a biannual basis, during the end of wet season (April/May), and end of dry season (September/October).
- A broad sampling and analysis event for the collection of surface water samples occurring on a biannual basis during the start of wet season (December/January), and at the end of the wet season (April/May).
- A broad sampling and analysis event for the collection of sediment samples occurring on an annual basis at the end of the wet season (April/May)

Details of the completed scope are provided in **Section 3.2**.

3.2 Summary of monitoring

A summary of the monitoring works implemented as part of the SAQP (AECOM, 2022a) between November 2021 and March 2023 is summarised in **Table 2**, below.

Table 2 Summary of monitoring works

Sampling Matrix	Sampling Event	Sampling Date	Scope
Groundwater	End of dry biannual event	2 and 3 November 2021	Sampling at 18 of 18 planned groundwater monitoring wells.
Surface water	Start of wet biannual event	20 January 2022	Sampling at 9 of 9 planned surface water monitoring locations.
Groundwater	End of wet biannual event	20, 21, 22 April 2022 and 30 May 2022	Sampling at 18 of 18 planned groundwater monitoring wells.
Surface water	End of wet biannual event	21 April 2022	Sampling at 7 of 9 planned surface water monitoring locations.
Sediment	End of wet annual event	20 and 21 April 2022	Sampling at 9 of 9 planned sediment monitoring locations
Groundwater	End of dry biannual event	19, 20, 21 September 2022	Sampling at 17 of 18 planned groundwater monitoring wells.
Surface water	Start of wet biannual event	24 and 28 November 2022	Sampling at 9 of 9 planned surface water monitoring locations.
Groundwater	End of wet biannual event	21, 22 and 23 March 2023	Sampling at 18 of 18 planned groundwater monitoring wells.

Sampling Matrix	Sampling Event	Sampling Date	Scope
Surface water	End of wet biannual event	21, 22 and 23 March 2023	Sampling at 8 of 9 planned surface water monitoring locations.

3.3 Deviations from the SAQP

The works undertaken over the monitoring period were completed in general accordance with the SAQP (AECOM, 2022a) and/or OMP (Defence, 2018) with few deviations which are identified in the associated Sampling Event Factual Reports (**Appendix B)** and summarised in **Table 3** below.

Table 3 Summary of SAQP deviations

SAQP requirement	Sampling event deviation	Impact of deviation on dataset
End of dry season groundwater sampling event (November 2021)		
Sampling of all OMP groundwater locations.	Monitoring location MW023 was dry and not able to be sampled. Monitoring location MW024 was sampled in lieu of MW023.	The alternative/contingency well MW024 was considered suitable to provide coverage for the assessment of PFAS impacts in the area. The overall dataset is not considered to have been impacted by this change.
Start of wet season surface water sampling event (January 2022)		
No deviations reported during this sampling event.		
End of wet season sampling event (April/May 2022)		
Sampling of all OMP groundwater locations.	Monitoring location MW023 was damaged and not able to be sampled. Monitoring location MW024 was sampled in lieu of MW023.	The alternative/contingency well MW024 was considered suitable to provide coverage for the assessment of PFAS impacts in the area. The overall dataset is not considered to have been impacted by this change. Note that MW023 was repaired prior to the subsequent sampling event.
Sampling of all OMP surface water locations.	Monitoring locations SW028 and SW023 were dry and not able to be sampled.	The gap in surface water data is not considered to impact the overall outcome of the assessment as both locations are on-Base. Downstream surface water locations were able to be sampled to assist in understating the impact to the receptors in the receiving environment.
Sediment samples to be collected from the sediment/water interface (0.0 to 0.1 m bgl). Where practicable, a grab sample will be collected wearing fresh disposable nitrile gloves. Where this sampling methodology is not possible, a hand trowel or shovel must be used.	Sediment samples were collected at the sediment/water interface between approximately 0.0 and 0.1 m bgl. At locations where water was present in creeks and drains, a laboratory-supplied high-density polyethylene-free soil jar was lowered into the water body using a stainless-steel sampling pole and nitrile gloves. The sediment was collected directly into the jars until sampling jar capacity was met.	The change to the sampling methodology is not considered to have a material impact on the monitoring results or interpretation, given samples were collected directly into laboratory provided sample containers.

End of dry season groundwater sampling event (September 2022)		
Sampling of all OMP groundwater locations.	Monitoring location MW004 was not sampled due to root growth preventing deployment of HydraSleeve™. No alternate location was available for this location during this sampling event.	The lack of data from MW004 has marginal impact on the understanding of concentration changes within the source area. However, given that the issue was resolved in the subsequent event and sampling was completed, the overall dataset is not considered to have been impacted by this change.
	Monitoring location MW023 was dry and not able to be sampled. Monitoring location MW024 was sampled in lieu of MW023.	The alternative/contingency well MW024 was considered suitable to provide coverage for the assessment of PFAS impacts in the area. The overall dataset is not considered to have been impacted by this change.
Start of wet season surface water sampling event (November 2022)		
In-situ field parameter collection for surface water.	Field parameter data was collected for surface water ex-situ.	Given that the collection of surface water field parameters ex-situ provides comparable results to in-situ parameters, when conducted immediately after the water is collected, this deviation is not considered to impact the dataset. Review of the in-situ results confirms that the results are comparable to the historic dataset.
Field observations	Observations of surface water body, specifically size of water body (stream width and depth), was not recorded.	This deviation limits interpretation of site conditions and may have a minor impact on future use of the historical data.
End of wet season sampling event (March 2023)		
Field parameter collection for groundwater.	Field parameters were not collected at the following locations: • Monitoring location MW023; insufficient water volume present. • Monitoring locations MW112 and MW113, field parameters not collected due to field staff being given limited time to collect samples by Base escort and not gaining access to return to collect field parameters.	Collection of field parameters from MW112 and MW113 is utilised primarily as reference data and not included for interpretation purposes as both locations are outside of the PFAS groundwater plume area. Monitoring locations MW112 and MW113 are sampled to ensure no PFAS is detected in water from these locations as the bores are used for potable water. Due to the distance between the bores and the identified PFAS groundwater plume it is not anticipated that PFAS would be detected in water from these bores.

		The loss of field parameters from this location is considered to have a minor impact on the dataset and does not impact the ability to interpret results.
Quality Assurance/Quality Control (QA/QC) samples. The SAQP requires the decontamination of field equipment (water level probe) between gauging locations using Liquinox and PFAS free water.	On 22 March 2023, a rinsate blank sample was inadvertently collected from equipment which had not been decontaminated.	The quality of the analytical data has still been assessed as acceptable, with any potential cross contamination considered unlikely based on the following: • Available rinsate and field blank samples reported results below the laboratory limit of reporting (LOR) . • Sampling equipment was either dedicated, disposable or decontaminated between each sample location. • Results obtained from locations sampled on 22 March 2023 were within historical concentration ranges, and do not suggest cross contamination had occurred.
Sampling of all OMP surface water locations.	Monitoring location SW023 was dry and not able to be sampled.	The gap in surface water data is not considered to impact the overall outcome of the assessment as SW023 is located on-Base. Downstream surface water locations were still sampled to assist in understating the impact to the receptors in the receiving environment.
Field parameter collection for surface water.	The field parameter data at locations SW028 and SW075 were lost due to electronic data collection fault, where the data was not saved and could not be retrieved.	Collection of field parameters for surface water locations is conducted to understand if there are changes in the physical or chemical properties of the water collected at each sample location, and to compare to groundwater physical and chemical properties to determine if groundwater contributes to surface water at specific sample locations. Surface water in the vicinity of SW028 is not anticipated to have groundwater interaction as it is located in a higher area on base outside of the groundwater influence zone. Field parameters were collected from locations both upgradient and down-gradient of SW075. The loss of field parameters from this location is considered to have a minor impact on the dataset and does not impact the ability to interpret results.
In-situ field parameter collection for surface water.	Field parameter data was collected ex-situ for surface water.	Given that the collection of surface water field parameters ex-situ provides comparable results to in-situ parameters, when conducted

		immediately after the water is collected, this deviation is not considered to impact the dataset.
Field observations	Observations of surface water body, specifically size of water body (stream width and depth), was not recorded.	This deviation limits interpretation of site conditions and may have a minor impact on future use of the historical data.
Sediment sampling	No sediment samples were collected.	Given that the concentrations of PFAS in sediment were consistently below LOR or at very low concentrations (i.e. close to the LOR), it has been considered sediment sampling is no longer required as part of the OMP. As such, this deviation has no impact on the dataset. Additionally, the requirement for sediment sampling has also been removed from the new revision of the OMP (completed in February 2023), to be implemented during the next monitoring period.

4.0 Quality assurance and quality control

Data validation pertaining to the data in this report has been completed and discussed within the factual reports listed in **Section 1.2**.

Data validation procedures employed in the assessment of the field and laboratory QA/QC data indicated that the reported analytical results are representative of the sample locations and that the overall quality of the analytical data produced is acceptably reliable for the purpose of the factual and ongoing monitoring reports.

The following key QA/QC anomaly was reported during the monitoring period:

- PFAS was detected in an inter-laboratory duplicate sample analysed from MW024 during the end of wet April 2022 groundwater sampling event (sampled as an alternate monitoring location for MW023). This location was resampled in May 2022 to confirm the results. Given the concentrations of PFAS were reported below LOR it was considered the original detection may be related to a laboratory error or potential cross contamination issue. Note that the analytical results from the resampling of MW024 were adopted for interpretive purposes, and the overall dataset was not considered to have been impacted by this issue.

AECOM considers the data obtained during the current monitoring period, along with the historical data assessed, to be representative of the conditions at the time of monitoring and to be suitable for the temporal assessment of the data in the Monitoring Area.

Additionally, all data collected during the monitoring events were reviewed and uploaded to the Defence ESdat database in accordance with Defence Contamination Management Manual (DCMM) (Defence, 2019) Annex L requirements.

5.0 Assessment criteria

The adopted screening criteria references the PFAS National Environmental Management Plan 2.0 (NEMP) (HEPA, 2020) Defence estate and environmental strategies, and Defence PFAS-specific strategies and guidance. At the time of preparing this report, the primary guidance document utilised is the *PFAS National Environmental Management Plan (version 2.0)* (NEMP) (HEPA, 2020).

The PFAS screening criteria adopted to assess the data generated from the monitoring are presented in **Table 4** and **Table 5**.

The adopted screening criteria included values for the following analytes:

- Perfluorooctane sulfonate (PFOS)
- Sum of Perfluorooctane sulfonate and Perfluorohexane sulfonate (PFOS+PFHxS)
- Perfluorooctanoic acid (PFOA).

Table 4 Summary of adopted water screening criteria: human health

Pathway	Compound	Criteria	Comment/Reference
Drinking water – groundwater	PFOS + PFHxS	0.07 µg/L	The values presented in the PFAS NEMP (HEPA, 2020). *All groundwater results were compared to these criteria.*
	PFOA	0.56 µg/L	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	The values presented in the PFAS NEMP (HEPA, 2020) based on (NHMRC, 2019) guidance on the assessment of PFAS in recreational water released in August 2019. *All surface water results were compared to these criteria.*
	PFOA	10 µg/L	

Notes:
µg/L = micrograms per Litre

Table 5 Summary of adopted water screening criteria: ecological

Media	Compound	Criteria	Comment/Reference
Freshwater (99% species protection values) – groundwater and surface water	PFOS	0.00023 µg/L	The presented values are from the PFAS NEMP (HEPA, 2020). The 99% level of protection has been applied for slightly to moderately disturbed ecosystems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. For the purposes of preliminary screening of analytical water results, the laboratory LOR will be adopted rather than sole use of the criteria value. *All groundwater and surface water results were compared to these criteria.*
	PFOA	19 µg/L	

Notes:
HEPA (2020) notes that the 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. The laboratory PFOS LOR adopted in this report is 0.001 µg/L.

It is noted that at the time this report was prepared no HEPA (2020) endorsed criteria was available for PFAS in sediments.

6.0 Contextual and ancillary information

6.1 Additional analytical data

AECOM is not aware of other PFAS related projects completed during the monitoring period within the Monitoring Area for inclusion in this report.

6.2 PFAS remediation projects

AECOM is not aware of any PFAS or other contamination remediation projects being completed or proposed to be completed at the Base which may have any impact on the identified PFAS source areas. Defence informed AECOM that there was no update on the status of remediation projects to be undertaken at the Base.

6.3 Infrastructure projects

Some development and refurbishment work at the Base have been completed since November 2018. All works have been managed with appropriate environmental management controls and approvals. AECOM is not aware of any practices or incidents which are likely to influence the nature or extent of PFAS at the Base.

6.4 Significant weather events

The monitoring period was characterised by a period of hot, humid and wet summers and hot and dry winters as recorded at Darwin Airport (Station 014015), located within RAAF Base Darwin (BOM, 2023).

The monthly rainfall during the monitoring period was generally consistent with the long-term average for the months of April to September, and well below average (~ 100 mm) for March (in all three years). Monthly total rainfall during the months of October to February varied across the monitoring period, whilst December in both 2021 and 2022 greatly exceeded (> 100 mm) the long-term average (**Plate 1)**.

Total rainfall for the period July 2021 to June 2022 was calculated as 1,606 mm, which is less than the mean annual rainfall of 1,724 mm (BOM, 2023). Whereas total rainfall for the period July 2022 to June 2023 was calculated as 1,985 mm, which is greater than the mean annual rainfall of 1,724 mm (BOM, 2023).

Temperatures exceeded the long-term average for the majority of 2021 and 2022, returning to the long-term average in 2023 (**Plate 2)**. This aligns with the drier first half of 2022 with below average rainfall for most of 2023.

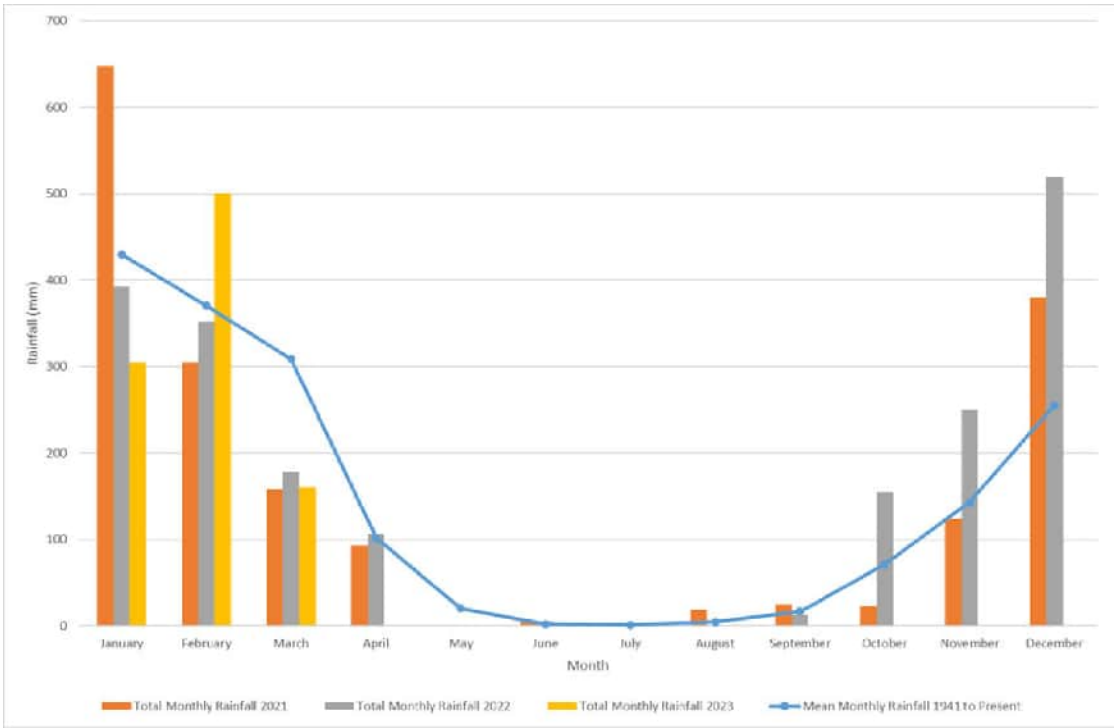


Plate 1 **Rainfall data – Monitoring period and mean monthly rainfall for Darwin Airport (1941 to present) (Station 014015) (BOM, 2023)**



Plate 2 **Temperature data – Monitoring period and mean monthly temperature for Darwin Airport (1941 - present) (Station 014015)** (BOM, 2023)

Groundwater Considerations

The OMP (Defence, 2018) requires groundwater sampling to be conducted at end of dry season (during September/October), however for the end of dry season 2021 sampling event, the groundwater samples were collected at the start of November 2021.

It is noted that, under normal climatic conditions, November is generally considered a transitional period between the dry and wet season, however considering the samples were collected at the start of the month, prior to the start of significant rainfalls (14 mm of rainfall recorded in November 2021 prior and during sampling, and 110 mm of rainfall recorded in November 2021 following sampling) groundwater levels are unlikely to be materially impacted by rain totals during this transitional period.

The 2021 period had lower volumes of precipitation leading up to the November 2021 event. Review of the gauging data from this round found groundwater elevations for the November 2021 to be within the expected range for the late dry season, and the impact on data quality and representativeness is likely to be negligible.

Surface Water Considerations

Surface water sampling occurs twice in the wet season, with:

- The first event typically occurs in December/January targeting as soon as practicable after the start of the higher rainfall periods, as the end of dry season/start of wet season is normally characterised by spikes in surface water concentrations (often referred to as “first-flush” sampling); and
- The second sampling event occurs at the end of the wet season.

Above average rainfall was recorded from October to December 2022, which would function as the first-flush event. This period was followed by a drier than average January 2023. As the first-flush rainfall events were earlier than anticipated and inconsistent with the long-term average, the targeted surface water sampling event for the start of the wet season 2022 was slightly later than intended and missed the first flush rainfall events in October.

The sampling undertaken in November 2022 was in line with the second instance of significant rainfall for the 2022 wet season. Whilst this should be noted when reviewing concentration trends in **Section 8.5**, the minor variance in timing does not seem to have significantly impacted the results obtained for the round (refer to **Table T4** in **Appendix B**), which were largely consistent with start of wet seasons results obtained historically.

Overall, the cyclical nature of the wet and dry seasons at the Monitoring Area may result in variability to the hydrogeological system and the data collected. This can include changes to water levels and other characteristics associated with groundwater and surface water such as flow rate, flow direction and gradient.

7.0 Monitoring data summary

As part of the OMP, as detailed in **Section 1.2** the following 8 sampling events were completed by AECOM across the monitoring period:

- November 2021 (AECOM, 2022b)
  - End of dry groundwater sampling between 2 and 3 November 2021
- January 2022 to April/May 2022 (AECOM, 2023a)
  - Start of wet surface water sampling on 20 January 2022.
  - End of wet groundwater sampling between 20 and 22 April 2022, and 30 May 2022
  - End of wet surface water sampling on 21 April 2022.
  - Annual sediment sampling on 20 and 21 April 2022.
- September 2022 (AECOM, 2023b)
  - End of dry groundwater sampling between 19 and 21 September 2022
- November 2022 to March 2023 (AECOM, 2023c)
  - Start of wet surface water sampling on 24 and 28 November2022
  - End of wet groundwater sampling between 21 and 23 March 2023
  - End of wet surface water sampling between 21 and 23 March 2023

The sample locations are shown on **Figure F2** (**Appendix A**). The results are summarised in following sections and on figure series **Figure F4**, **Figure F5** and **Figure F6** (**Appendix A**) and in **Table T1** to **Table T6** (**Appendix B**).

The groundwater elevations are shown on figure series **Figure F3** (**Appendix A**).

7.1 Groundwater results

7.1.1 Groundwater field observations

The field observations during groundwater sampling are provided in **Table T1** in **Appendix B** and key observations are summarised below.

Groundwater observations for the monitoring period were recorded to generally be clear to moderately turbid, colourless to light brown or orange/yellow/brown, and mostly without odour or sheens, with the exception of the following:

- An organic or hydrogen sulphide odour was observed during one or more monitoring events at MW004, MW004D, MW012D, MW021, MW021D, MW029, MW030 and MW034.
- A strong hydrocarbon odour was observed during at MW034 during one monitoring event (September 2022).
- High turbidity was observed during one or more monitoring events at MW004, MW029, MW030 and MW031.

7.1.2 Groundwater elevation and flow direction

The groundwater standing water level (SWL) was measured, where possible, across all identified wells included in the OMP to evaluate the groundwater elevations (m AHD) in the Monitoring Area. This was done biannually during the transitional periods between dry and wet seasons and between the wet and dry seasons.

The gauging results are presented on **Table T1** (**Appendix B)**. A summary of the SWLs recorded and groundwater elevations for on-Base and off-Base monitoring wells from the monitoring period are presented in **Table 6** below.

Table 6 Summary of groundwater elevations

GME	No. Wells	Min. SWL (m btoc)	Max. SWL (m btoc)	Min. GWE (m AHD)	Max. GWE (m AHD)
On-Base groundwater monitoring wells: MW001, MW004, MW004D, MW012, MW012D, MW034, MW066, MW080					
End of dry season November 2021	8	2.86 (MW001)	8.44 (MW012D)	14.291 (MW034)	24.49 (MW012)
End of wet season April 2022	8	1.17 (MW001)	5.08 (MW012D)	17.01 (MW034)	27.28 (MW012)
End of dry season September 2022	8	2.68 (MW001)	8.42 (MW012)	13.57 (MW034)	23.06 (MW012D)
End of wet season March 2023	8	1.11 (MW001)	4.78 (MW012D)	17.27 (MW034)	27.49 (MW012)
Off- Base groundwater monitoring wells: MW018, MW021, MW021D, MW023, MW024, MW029, MW030, MW031, MW032					
End of dry season November 2021	8*	2.49 (MW030)	5.68 (MW032)	2.92 (MW024)	22.44 (MW029)
End of wet season April 2022	8*	0.81 (MW030)	2.62 (MW018)	4.85 (MW024)	23.72 (MW029)
End of dry season September 2022	9	2.29 ((MW030)	6.71 ((MW023)	3.88 (MW024)	22.17 (MW029)
End of wet season March 2023	9^	0.59 (MW029)	5.87 (MW023)	16.03 (MW021)	24.85 (MW029)

Notes:

mbtoc = m below top of casing
SWL = Standing water level
mAHD = m Australian Height datum
GWE = Groundwater elevation

* = groundwater level monitoring at off-Base well MW023 was unable to be undertaken due to the location being dry (November 2021 and September 2022) or damaged (April 2022), MW024 was monitored as an alternate.

^ = groundwater elevation (mAHD) unable to be calculated at MW023 as top of casing elevation had not been surveyed since repair.

Groundwater elevations and interpreted contours for each event (presented in figure series **Figure F3** in **Appendix A**), indicate groundwater elevation is highest in the western portion of the Base, with groundwater flowing to the north-east towards the CTA from the northern portion of the Base, and in the southern end of the Base groundwater flows east towards the catchment of Milners Creek. This is generally consistent with previous investigations.

7.1.3 Groundwater geochemical parameters

During each sampling event, groundwater geochemical parameter field measurements were recorded prior to collecting groundwater samples, with the exception of MW023, MW112 and MW113 in March 2023 as detailed in **Table 3** (**Section 3.3**). All collected parameters are tabulated in **Table T1** (**Appendix B**).

The minimum and maximum recorded field parameters for the monitoring period are provided in **Table 7**. Overall, the field parameter readings from the monitoring period are considered consistent with previous investigations where sufficient data exists to evaluate parameter consistency.

Table 7 Groundwater quality parameter ranges (minimum – maximum)

Event	No. of samples	Dissolved oxygen (mg/L)	Electrical conductivity (µS/cm)	pH	Corrected redox* (mV)	Temperature (°C)
On-Base groundwater monitoring wells: MW001, MW004, MW004D, MW005, MW012, MW012D, MW034, MW066, MW080						
Historical (April 2019 to June 2021)	38	0.09 (MW034) – 19.00 (MW001). *Poor to well oxygenated conditions*	6.63 (MW004D) – 814 (MW004) *Freshwater conditions*	3.75 (MW034) – 6.99 (MW034) *Acidic - neutral conditions*	44.6 (MW004) – 655.8 (MW066) *Slightly oxidising - Oxidising conditions*	28.3 (MW034) – 33.7 (MW034)
End of dry season November 2021	8	0.44 (MW004) – 2.06 (MW066) *Poor to oxygenated conditions*	36.9 (MW012) - 489.3 (MW004) *Freshwater conditions*	4.03 (MW080) - 5.33 (MW034) *Acidic - slightly acidic conditions*	143.2 (MW004D) – 413.2 (MW012) *Oxidising conditions*	28.6 (MW034) – 32.1 (MW066)
End of wet season April 2022	8	0.78 (MW080) - 5.05 (MW012D) *Poor to oxygenated conditions*	73.4 (MW012) – 354.2 (MW004D) *Freshwater conditions*	4.20 (MW066) - 6.51 (MW004D) *Acidic - neutral conditions*	199.1 (MW004D) - 354.2 (MW066) *Oxidising conditions*	30.5 (MW001) – 32.9 (MW004)
End of dry season September 2022	7	1.34 (MW034) – 1.82 (MW080) *Poor to oxygenated conditions*	*32.3 (MW012) – 341.4 (MW004D)* *Freshwater conditions*	4.38 (MW080) - 6.71 (MW004D) *Acidic - neutral conditions*	157.7 (MW004D) - 447.6 (MW012) *Oxidising conditions*	29.0 (MW001) – 32.7 (MW066)
End of wet season March 2023	8	0.55 (MW080) - 2.25 (MW012D) *Poor to oxygenated conditions*	36.6 (MW034) – 359 (MW004D) *Freshwater conditions*	4.38 (MW066) - 6.68 (MW004D) *Acidic - neutral conditions*	189 (MW004D) - 405.7 (MW066) *Oxidising conditions*	29.2 (MW001) – 32.2 (MW012)

Event	No. of samples	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH	Corrected Redox (mV)	Temperature (°C)
Off- Base groundwater monitoring wells: MW018, MW021, MW021D, MW023, MW024, MW029, MW030, MW031, MW032, MW112, MW113						
Historical (April 2017 to April 2021)	36	0.00 (MW029) – 36.40 (MW113). *Poor to well oxygenated conditions*	29.1 (MW032) – 404.6 (MW112) *Freshwater conditions*	4.71 (MW021) – 7.81 (MW021) *Acidic - neutral conditions*	121.1 (MW113) – 589.5 (MW032) *Oxidising conditions*	28.4 (MW034) – 33.2 (MW112)
End of dry season November 2021	10	0.70 (MW018) – 2.28 (MW021) *Poor to oxygenated conditions*	41.4 (MW018) - 1,902.0 (MW024)* *Freshwater to saline conditions* **All wells other than MW024 reported values below 400 µS/cm*	3.70 (MW031) - 5.90 (MW112/MW113) *Acidic - slightly acidic*	239.3 (MW112) – 418.2 (MW018) *Oxidising conditions*	24.8 (MW113) – 32.1 (MW024)
End of wet season April/May 2022	10	2.98 (MW112) - 8.34 (MW018) *Poor to oxygenated conditions*	78.2 (MW032) – 693.0 (MW024) *Freshwater conditions*	4.59 (MW031) – 6.82 (MW113) *Acidic - neutral conditions*	198.62 (MW029) – 312.4 (MW031) Oxidising conditions	28.9 (MW001) – 31.3 (MW031/MW113)
End of dry season September 2022	10	1.28 (MW029) - 3.16 (MW021) *Poor to oxygenated conditions*	33.7 (MW029) – 799.0 (MW112)* *Freshwater conditions*	4.89 (MW021) - 7.32 (MW112) *Acidic to slightly alkaline conditions*	147.2 (MW113) – 388.8 (MW021D) Oxidising conditions	29.0 (MW030) – 33 (MW113)
End of wet season March 2023	10 (7)[1]	0.88 (MW029) - 2.32 (MW021D) *Poor to oxygenated conditions*	5.5 (MW031) – 151.2 (MW021D) *Freshwater conditions*	5.00 (MW030) – 6.07 (MW021D) *Acidic – neutral conditions*	258 (MW029) – 275.7 (MW030) *Oxidising conditions*	28.4 (MW021D) – 30.8 (MW029)

Notes:

µS/cm: microSiemens per centimetre
mg/L: milligrams per Litre
mV: millivolts
°C: degrees Celsius
*Corrected Redox = redox potential relative to the standard hydrogen electrode (Eh = Er + 200mV)
[1] = 10 locations sampled; parameters only collected from seven locations (not collected from MW023, MW112, MW113).

7.1.4 Groundwater analytical results

All groundwater analytical results for each sampling event conducted in monitoring period are presented in historical groundwater analytical results **Table T2** (**Appendix B**).

Groundwater monitoring analytical results for both on- and off-Base wells for PFOS, PFOA and PFOS+PFHxS are summarised in **Table 8** and presented on concentration maps for PFOS+PFHxS in figure series **Figure F4** (**Appendix A**).

Deviations from historical groundwater dataset are also summarised **Table 8**. Concentrations of PFOS and PFOS+PFHxS exceeded historical ranges in MW004 (on-Base) and MW030 (off-Base) in November 2021 and MW031 (off-Base) in March 2023.

The groundwater analytical results for the monitoring in relation to source areas, cross gradient and down-gradient are summarised in **Section 8.2** and **Section 8.3**.

Table 8 Summary of PFOS, PFOA and PFOS+PFHxS concentrations in groundwater

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (µg/L)	New maximum concentration reported (µg/L)	No. of sample locations with concentrations > LOR	No. of sample locations exceeding human health criteria	No. of sample locations exceeding ecological criteria*
On-Base monitoring well locations: MW001, MW004, MW004D, MW005, MW012, MW012D, MW034, MW066, MW080							
End of dry season November 2021	8	PFOS	0.02 (MW080) to 0.42 (MW066)	0.32 (MW004)	5	NA	5
		PFOA	0.01 (MW034) to 0.02 (MW066)	-	2	0	0
		PFOS+PFHxS	0.03 (MW080) to 0.54 (MW066)	0.44 (MW004)	5	4	NA
End of wet season April/\May 2022	8	PFOS	0.03 (MW004) to 0.34 (MW066)	-	4	NA	4
		PFOA	0.02 (MW066)	-	1	0	0
		PFOS+PFHxS	0.04 (MW004) to 0.42 (MW066)	-	4	3	NA
End of dry season September 2022	7	PFOS	0.07 (MW080) to 0.39 (MW066)	-	4	NA	4
		PFOA	0.02(MW066)	-	1	0	0
		PFOS+PFHxS	0.11 (MW034) to 0.53 (MW066)	-	4	3	NA
End of wet season March 2022	8	PFOS	0.08 (MW034) to 0.52 (MW066)	-	5	NA	4
		PFOA	0.03 (MW066)	-	1	0	0
		PFOS+PFHxS	0.01 (MW034) to 0.65 (MW066)	-	5	5	NA
Off-Base monitoring well locations: MW018, MW021, MW021D, MW023, MW024, MW029, MW030, MW031, MW032, MW112, MW113							
End of dry season November 2021	10	PFOS	0.05 (MW032) to 0.32 (MW030)	0.32 (MW030)	2	NA	2
		PFOA	0.01 (MW030)	-	1	0	0
		PFOS+PFHxS	0.08 (MW032) to 0.40 (MW030)	0.40 (MW030)	2	2	NA
End of wet season	10	PFOS	0.03 (MW004) to 0.10 (MW030)	-	3	NA	3
		PFOA	All <LOR	-	0	0	0

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (µg/L)	New maximum concentration reported (µg/L)	No. of sample locations with concentrations > LOR	No. of sample locations exceeding human health criteria	No. of sample locations exceeding ecological criteria*
April/May 2022		PFOS+PFHxS	0.04 (MW004) to 0.14 (MW030)	-	3	2	NA
End of dry season September 2022	10	PFOS	0.05 (MW032) to 0.11 (MW030)	-	2	NA	2
		PFOA	All <LOR	-	0	0	0
		PFOS+PFHxS	0.08 (MW032) to 0.16 (MW030)	-	2	2	NA
End of wet season March 2022	9	PFOS	0.03 (MW031) to 0.08 (MW030)	0.03 (MW031)	3	NA	3
		PFOA	All <LOR	-	0	0	0
		PFOS+PFHxS	0.03 (MW031) to 0.11 (MW030)	0.03 (MW031)	3	2	NA

Notes:
* Denotes that some samples may exceed the Freshwater 99% Species Protection Guideline (HEPA 2020) due to the Limit of Reporting being greater than the Guideline Criteria.
- Denotes no knew maximum concentrations reported
<LOR = below the laboratory limit of reporting
NA = Not applicable (no applicable guideline)
Human health criteria for groundwater denotes drinking water – groundwater PFAS NEMP (HEPA, 2020).
Ecological criteria for groundwater denotes Freshwater (99% species protection values) PFAS NEMP (HEPA, 2020).

7.2 Surface water results

7.2.1 Surface water field observations

The field observations during surface water sampling are provided in **Table T3** in **Appendix B**, and key observations are summarised below.

Surface water observations for the monitoring period were recorded to generally be clear/low turbidity, colourless, without odour or sheens, with the exception of the following:

- Organic odour was observed at:
  - SW007 and SW123 in November 2022
- Slight brown to yellow colouration was observed at:
  - SW023 and SW028 in January 2022
  - SW059, SW091 and SW123 in April 2022
  - SW007, SW059, SW075, SW086 and SW091 in November 2022
- Moderate to high visual turbidity was observed at:
  - SW023 and SW028 in January 2022
  - SW007 and SW075 in November 2022
  - SW007 and SW091 in March 2023

Surface water locations SW023 and SW028 were reported to be dry in April 2022, with pooled water (no flow) observed at SW023 and SW028 in November 2022. Surface water location SW023 was also reported to be dry in March 2023.

7.2.2 Surface water geochemical parameters

Surface water geochemical parameter field measurements were recorded at the time of collecting samples. The recorded water quality parameters are provided in full as **Table T3 (Appendix B)**.

The maximum and minimum recorded field parameters for the monitoring period are provided in **Table 10**. Overall, the field parameter readings from monitoring period are considered consistent with previous investigations where sufficient data exists to evaluate parameter consistency.

Table 9 Surface water quality parameter ranges (min – max)

Sampling event	No. of samples	Dissolved oxygen (mg/L)	Electrical conductivity (µS/cm)	pH	Corrected redox* (mV)	Temperature (°C)
On- Base surface water monitoring locations: SW001, SW007, SW023, SW028, SW059						
Historical (December 2019 to April 2021)	14	2.72 (SW007) – 73.40[1] (SW001) *Poor to well oxygenated conditions*	8.8 (SW028) – 83.6 (SW001) *Freshwater to saline conditions*	5.42 (SW007) – 7.92 (SW007) *Slightly acidic to slightly alkaline conditions*	297.4 (SW059) – 441.7 (SW007) *Oxidising conditions*	24.4 (SW007) – 35.6 (SW007)
Start of wet season January 2022	5	4.37 (SW001) - 7.38 (SW007) *Oxygenated conditions*	5.6 (SW028) – 45.3 (SW001) *Freshwater conditions*	5.58 (SW001) – 5.84 (SW0028) *Slightly acidic conditions*	374.5 (SW007) – 411.3 (SW059) *Oxidising conditions*	27.9 (SW123) - 32.3 (SW075)
End of wet season April 2022	3	2.53 (SW001) – 4.02 (SW059) *Oxygenated conditions*	53.6 (SW007) – 246.7 (SW001) *Freshwater conditions*	5.49 (SW001) – 6.82 (SW059) *Slightly acidic to neutral conditions*	272.3 (SW007) – 305.2 (SW059) *Oxidising conditions*	30.8 (SW001) – 34.2 (SW059)
Start of wet season November 2022	5	1.51 (SW001) – 2.81 (SW023) *Poor to oxygenated conditions*	13.5 (SW028) – 77.0 (SW001) *Freshwater conditions*	6.15 (SW007) – 6.97 (SW023) *Neutral conditions*	276.7 *(SW059)*- 475.8 *(SW023)* *Oxidising conditions*	27.3 (SW023) – 32.6 (SW001)
End of wet season March 2023	4(3)[2]	1.23 (SW001) – 1.94 (SW007) *Poor to oxygenated conditions*	23.3 (SW059) – 195.6 (SW007) *Freshwater conditions*	5.01 (SW059) – 5.45 (SW007) *Slightly acidic conditions*	231.6 (SW007) – 349.2 (SW059) *Oxidising conditions*	29.9 (SW001) – 30.4 (SW007)

Sampling event	No. of samples	Dissolved oxygen (mg/L)	Electrical conductivity (µS/cm)	pH	Corrected redox (mV)	Temperature (°C)
Off- Base surface water monitoring locations: SW075, SW086, SW091, SW123						
Historical (April 2017 to April 2021)	19	0.56 (SW123) – 55.50 (SW075). *Poor to well oxygenated conditions*	19.1 (SW123) – 176.1 (SW091) *Freshwater conditions*	5.31 (SW086) – 8.40 (SW091) *Slightly acidic to slightly alkaline conditions*	270.1 (SW091) – 461.0 (SW075) *Oxidising conditions*	25.0 (SW075) – 34.9 (SW086)
Start of wet season January 2022	4	2.92 (SW123) - 3.80 (SW075) *Oxygenated conditions*	21.5 (SW123) – 40.5 (SW086) *Freshwater conditions*	6.44 (SW091) – 6.85 (SW086) *Neutral conditions*	309 (SW086) – 344.5 (SW123) *Oxidising conditions*	29.1 (SW123) - 32.5 (SW075)
End of wet season April 2022	4	3.62 (SW075) – 4.47 (SW086) *Oxygenated conditions*	49.2 (SW123) – 64.5 (SW075) *Freshwater conditions*	5.43 (SW075) – 6.68 (SW086) *Slightly acidic to neutral conditions*	258.2 (SW086) – 280.5 (SW075) *Oxidising conditions*	28.2 (SW075) – 29.9 (SW091)
Start of wet season November 2022	4	3.19 (SW123) – 3.66 (SW075) *Oxygenated conditions*	17.4 (SW075) – 44.2 (SW086) *Freshwater conditions*	5.84 (SW086) – 6.57 (SW075) *Slightly acidic to neutral conditions*	280.4 *(SW123)*- 316.6 *(SW086)* *Oxidising conditions*	-
End of wet season March 2023	3	4.94 (SW123) – 5.62 (SW091) *Oxygenated conditions*	34.8 (SW123) – 44.3 (SW091) *Freshwater conditions*	5.82 (SW086) – 6.09 (SW091) *Slightly acidic to neutral conditions*	238.4 (SW091) – 248.2 (SW086) *Oxidising conditions*	29.7 (SW123) – 30.1 (SW091)

Corrected Redox = redox potential relative to the standard hydrogen electrode (Eh = Er + 200mV)

[1] = This value is likely a field reporting or equipment reporting error.

[2] = Four locations sampled, however parameters only collected from three locations (not collected from SW028).

7.2.3 Surface water analytical results

Historical surface water analytical results for the monitoring period are presented in **Table T4** (**Appendix B**).

Surface water monitoring analytical results for both on- and off-Base wells for PFOS, PFOA and PFOS+PFHxS are summarised in **Table 10** and presented on concentration maps for PFOS+PFHxS in figure series **Figure F5 (Appendix A)**.

Deviations from historical surface water dataset are also summarised **Table 10** below. Concentrations of PFOA at SW123 (off-Base) in November 2022 and March 2023 and PFOS+PFHxS at SW007 (on-Base) and SW123 (off-Base) in March 2023 exceeded historical ranges.

The surface water analytical results for the monitoring of source areas and down-gradient areas are summarised in **Section 8.4** and **Section 8.5**.

Table 10 Summary of PFOS, PFOA and PFOS+PFHxS concentrations in surface water

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (µg/L)	New maximum concentrations reported (µg/L)	No. of sample locations with concentrations > LOR	No. of sample locations exceeding human health criteria	No. of sample locations exceeding ecological criteria*
On-Base surface water monitoring locations: SW001, SW007, SW023, SW028, SW059							
Start of wet season January 2022	5	PFOS	0.02 (SW001)	-	1	NA	1
		PFOA	All locations <LOR	-	0	0	0
		PFOS+PFHxS	0.03 (SW001)	-	1	0	NA
End of wet season April 2022	3	PFOS	0.02 (SW001) to 0.18 (SW059)	-	2	NA	2
		PFOA	All locations <LOR	-	0	0	0
		PFOS+PFHxS	0.02 (SW001) to 0.25 (SW059)	-	2	0	NA
Start of wet season November 2022	5	PFOS	0.01 (SW001) to 0.03 (SW059)	-	2	NA	2
		PFOA	All locations <LOR	-	0	0	0
		PFOS+PFHxS	0.01 (SW001) to 0.03 (SW059)	-	2	0	NA
End of wet season March 2023	4	PFOS	0.01 (SW001) to 0.17 (SW059)	-	3	NA	3
		PFOA	All locations <LOR	-	0	0	0
		PFOS+PFHxS	0.05 (SW001) to 0.22 (SW059)	0.06 (SW007)	3	0	NA
Off-Base surface water monitoring locations: SW075, SW086, SW091, SW123							
Start of wet season January 2022	4	PFOS	0.02 (SW075, SW091 & SW123)	-	3	NA	3
		PFOA	All locations <LOR	-	0	0	0
		PFOS+PFHxS	0.02 (SW091) to 0.03 (SW075 & SW123)	-	3	-	NA
End of wet season April 2022	4	PFOS	0.02 (SW091 & SW123)	-	2	NA	2
		PFOA	All locations <LOR	-	0	0	0
		PFOS+PFHxS	0.03 (SW091) to 0.04 (SW123)	-	2	0	NA

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (µg/L)	New maximum concentrations reported (µg/L)	No. of sample locations with concentrations > LOR	No. of sample locations exceeding human health criteria	No. of sample locations exceeding ecological criteria*
Start of wet season November 2022	4	PFOS	0.10 (SW075) to 0.20 (SW123)	-	3	NA	3
		PFOA	0.01 (SW123)	0.01 (SW123)	1	0	0
		PFOS+PFHxS	0.01 (SW091) to 0.25 (SW123)	-	3	0	NA
End of wet season March 2023	4	PFOS	0.01 (SW075, SW086 & SW123)	-	3	NA	3
		PFOA	0.15 (SW123)	0.15 (SW123)	1	0	0
		PFOS+PFHxS	0.01 (SW075, SW086 & SW091) to 0.35 (SW123)	0.35 (SW123)	4	0	NA

Notes:
* Denotes that some samples may exceed the Freshwater 99% Species Protection Guideline (HEPA 2020) due to the Limit of Reporting being greater than the Guideline Criteria.
- Denotes no knew maximum concentrations reported
<LOR = below the laboratory limit of reporting
NA = Not applicable (no applicable guideline)
Human health criteria for surface water denotes recreational water – surface water PFAS NEMP (HEPA, 2020).
Ecological criteria for groundwater denotes Freshwater (99% species protection values) PFAS NEMP (HEPA, 2020).

7.3 Sediment results

7.3.1 Sediment sampling observations

Sediment sample observations recoded during the monitoring period are presented on **Table T5** in **Appendix B**.

The sediment encountered during the sampling event completed in April 2022 did not report any visible evidence of contamination, no odour was reported at the locations sampled.

The sediment matrix comprised mostly of red to brown with some grey coloured sand or silty sands, with clays observed at location SD028.

7.3.2 Sediment analytical results

Historical sediment analytical results for the monitoring period are presented in **Table T6** (**Appendix B)**.

Sediment monitoring analytical results for both on- and off-Base for PFOS, PFOA and PFOS+PFHxS are summarised in **Table 11** below and presented on concentration maps for PFOS+PFHxS in figure series **Figure F6 (Appendix A)**.

Deviations from historical groundwater dataset are also summarised **Table 11** below. Concentrations of PFOS and PFOS+PFHxS exceeded the historical ranges in SD059 (on-Base) and SD086 (off-Base) in April 2022.

The sediment analytical results for the monitoring of source areas and down-gradient areas are summarised in **Section 8.6**.

Table 11 Summary of PFOS, PFOA and PFOS+PFHxS concentrations in sediment

Sampling event	No. of sample locations analysed	Compound	New maximum concentration (mg/kg)	Concentration range (> LOR) (mg/kg)	No. of sample locations with concentrations > LOR
On-Base sediment monitoring locations					
April 2022	5	PFOS	0.0004 (SD059)	0.0003 (SD001) to 0.0004 (SD059)	2
		PFOA	-	All locations <LOR	0
		PFOS+PFHxS	0.0004 (SD059)	0.0003 (SD001) to 0.0004 (SD059)	2
Off-Base sediment monitoring locations					
April 2022	4	PFOS	0.0045 (SD086)	0.0007 (SD123) to 0.0045 (SD086)	3
		PFOA	-	All locations <LOR	0
		PFOS+PFHxS	0.0050 (SD086)	0.0007 (SD123) to 0.005 (SD086)	3

- Denotes no knew maximum concentrations reported
<LOR = below the laboratory limit of reporting

8.0 Interpretive analysis

In addition to the 2021/2023 OMP data, historical data from 2014 to 2021 was included in the assessment to analyse temporal trends, and the Base setting as outlined in **Section 1.2** was considered with regards to interpretation of the results. The historical data was obtained from the following reports:

- *Robertson Barracks – PFAS OMP Interpretive Report 2020* (AECOM, 2021a)
- *Robertson Barracks – PFAS OMP Interpretive Report 2021* (AECOM, 2022c)
- *Robertson Barracks – Ongoing Monitoring Report – October 2018 to May 2019* (Senversa, 2019)
- *Robertson Barracks – Detailed Site Inspection 2018* ((Senversa, 2018a)
- *Robertson Barracks – Human Health and Ecological Risk Assessment* (Senversa, 2018b).

For groundwater, where sufficient data is available, nominally eight or more like data points, Mann-Kendall (MK) statistical analysis has been utilised to determine the presence or non-presence of trends within individual monitoring locations. The smaller the sample set size available for statistical analysis the lower the potential accuracy of the statistical analysis results. As such, MK statistical analysis has only been applied to locations with a minimum of seven available data points. Additionally, where a location appears to be seasonally influenced with higher or lower concentrations reported during dry or wet seasons, the application of MK statistical analysis has been assessed to have limited benefit. In these instances, the assessment of results has been guided by temporal trend review instead. For surface water, temporal trend assessment of scatter plots presenting concentrations against daily rainfall averages were carried out.

8.1 Hydrogeology

The groundwater SWLs were measured in the groundwater monitoring wells biannually and converted to groundwater elevations (in mAHD). Depth to groundwater measurements are presented in **Table T1** (**Appendix B**) and the inferred potentiometric contours for the monitoring wells for the November 2021, April 2022, September 2022 and March 2023 monitoring events are presented in figure series **Figure F3** (**Appendix A**).

Groundwater levels fluctuate across the Monitoring Area over the wet and dry seasons, with higher groundwater levels recorded in the late wet season and lower groundwater levels recorded in the late dry season. Groundwater levels differ between one-metre and five-metres when compared to groundwater level monitoring between late wet and late dry season.

Inferred groundwater flow directions in the upper aquifer during the monitoring period was generally to the north-east from the Base towards Milners Creek and Shoal Bay, which is consistent with the flow presented in previous investigations.

8.2 Groundwater results overview

Groundwater results for PFOS+PFHxS compared to the assessment criteria are provided in figure series **Figure F4** (**Appendix A**), with PFAS concentrations presented in **Table T2** (**Appendix B**).

PFOS, PFOA or PFHxS concentrations were detected in monitoring wells down-hydraulic gradient from the identified PFAS source areas and suggest that the groundwater impacts are associated within the source areas. The maximum concentrations of PFOS+PFHxS reported during the monitoring period were as follows:

- **On-Base**: MW066 (Source Area 1), concentrations ranging between 0.36 to 0.65 µg/L (April 2022 and March 2023).
- **On-Base**: MW004 (Source Area 2), 0.04 to 0.44 µg/L (April 2022 and November 2021).
- **Off-Base**: MW030 (southern bore), 0.11 to 0.40 µg/L (March 2023 and November 2021).

The highest PFAS concentrations in the monitoring period were reported down-hydraulic gradient of Source Area 1.

The concentrations of PFOS and PFOS+PFHxS exceeded previous maximum concentrations at three locations during the monitoring period, as follows:

- **On-Base**: MW004 (November 2021) and MW031 (March 2023) (Source Area 2)
- **Off-Base**: MW030 (November 2022) (southern bore).

The new maximum concentrations of PFOS and PFOS+PFHxS reported at both MW004 and MW030 in November 2021 were of the same order of magnitude as historical range. Note that lower concentrations were reported within historical range at both locations in the subsequent monitoring events (April 2022 onwards).

Similarly, the new maximum concentrations of PFOS and PFOS+PFHxS reported at MW031 in March 2023 is within the same order of magnitude as historical range and remains close to the LOR.

The overall nature and extent of PFAS in groundwater within the Monitoring Area is generally consistent with the understanding presented in the 2021 AIR (AECOM, 2022c), with PFAS concentrations higher on-Base in the vicinity of known source areas, and lower in down-gradient locations. In general, the groundwater for the monitoring period and historically indicate that there is variability in concentrations of PFAS in groundwater within the Monitoring Area. The reported groundwater concentrations from the monitoring period and significance of any variation are discussed based on areas of interest in **Section 8.3** below.

8.3 Groundwater PFAS temporal trends

8.3.1 Approach to groundwater temporal trend analysis

A summary of PFOS+PFHxS and PFOA concentrations (including historical data) and temporal trend analysis for the five areas of interest specified in **Table 12** below are presented in tabular form and discussed in the following sub-sections (**Section 8.3.2** to **8.3.6**).

Table 12 Summary of groundwater monitoring areas

Area of interest	Groundwater monitoring well ID
Source Area 1	MW066, MW012, MW012D, MW021, MW021D
Northern bores	MW023[1], MW032 and MW034
Source Area 2 and 3	MW004[1], MW004D, MW018, MW031 and MW080
Southern bores	MW001, MW029 and MW030
Shoal Bay Receiving Station	MW112 and MW113

[1] Alternative location sample results used where indicated in lieu of primary location being unable to sample.

Temporal graphs and MK statistical analysis supporting the temporal trend analysis are presented in **Appendix D** and **Appendix E**, respectively.

The groundwater temporal graphs and MK statistical assessment only included locations which consistently reported concentrations of PFOS+PFHxS and/or PFOA greater than the LOR. Based on these criteria, **Table 13** below summarises the monitoring wells, and respective analytes, selected to be presented in temporal graphs and MK statistical assessment (separated into areas of interest). Where sample results were less than the LOR, half the LOR was adopted for the temporal graph and MK statistical analysis.

Table 13 Summary of locations Selected for groundwater temporal graphs and Mann-Kendall analysis

Area of interest	Graph ID	Analyte	Groundwater monitoring well ID
Source Area 1	G1	PFOA	MW066
	G2	PFOS+PFHxS	MW066
Northern monitoring wells	G3	PFOA	MW034
	G4	PFOS+PFHxS	MW032 and MW034
Source Area 2 and 3	G5	PFOS+PFHxS	MW004[1],MW031 and MW080
Southern monitoring wells	G6	PFOS+PFHxS	MW001 and MW030

[1] Alternative location sample results used where indicated in lieu of primary location being unable to sample.

The MK statistical analysis (using the historical and ongoing monitoring data) was used to assess whether concentrations in groundwater have a monotonic upward or downward trend. The significance of any identified trends is determined by the confidence factor, or p value, of the analysis, as follows:

- A confidence factor over 95% indicates that there is an increasing or decreasing trend.
- A confidence factor over 90% indicates the there is a 'probably increasing' or 'probably decreasing' trend.
- A confidence factor less than 90% indicates 'Stable' or 'No trend'.

Limitations of the MK statistical analysis is included in **Section 8.3.1.1**, which addresses data selection requirements and the impacts of seasonality on the statistical trends analysis.

8.3.1.1 Limitations of Mann-Kendall analysis

Statistical trend analysis was undertaken for the groundwater dataset where the historic monitoring dataset was sufficient to allow for insights to be made to an acceptable confidence level.

The MK statistical analysis has limited ability to accurately identify temporal changes when concentrations are close to the LOR. Hence, statistical trend analysis was only undertaken for select monitoring locations (presented in **Table 13**) where the historic monitoring dataset was sufficient to allow for insights to be made to an acceptable confidence level and which consistently reported greater than LOR for respective analytes.

MK statistical analysis has limited ability to detect temporal trends when seasonality is expected to be present in a dataset. Due to the seasonal variation of precipitation, corresponding fluctuations in groundwater levels, and seasonally influenced PFAS concentration variance, particularly noticeable at certain locations when examining temporal graphs (**Appendix E**), the results for each monitoring well for both late wet and late dry season conditions were evaluated separately where seasonal variation was observed.

8.3.2 Source Area 1

There are five monitoring wells screened in the upper and lower Bathurst units located up-gradient, within and down-gradient of Source Area 1. The five monitoring wells are summarised as:

- MW012 and MW012D: located up the inferred groundwater hydraulic gradient from Source Area 1, screened in the upper and lower aquifer respectively.
- MW066: located at Source Area 1 and screened in the upper aquifer unit.
- MW021 and MW021D: located down the inferred groundwater hydraulic gradient from Source Area 1, screened in the upper and lower aquifer respectively.

Historical concentrations of PFOS+PFHxS and PFOA in groundwater from the above listed locations are summarised in **Table 14** below, and presented in full as **Table T2** (**Appendix B**). Temporal graphs

(**Graph G1** and **G2, Appendix D**) present reported concentrations of PFOS+PFHxS and PFOA overtime within monitoring well MW066. As presented in **Table 14** below, wells MW012, MW012D and MW021 have consistently reported PFAS concentrations below the LOR and hence are not presented in the temporal graphs.

Table 14 Source Area 1: PFAS summary results (µg/L)

Well ID	Analyte	Historical range*		Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP monitoring period (November 2021 – March 2023)			
		Min	Max	Min	Max	Nov-21	Apr-22	Sep-22	Mar-23
MW066	PFOS+ PFHxS	0.40	1.71	0.33	0.55	0.54	0.42	0.53	0.65
	PFOA	<LOR	0.09	0.01	0.02	0.02	0.02	0.02	0.03
MW012	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW012D	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW021	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW021D	PFOS+ PFHxS	<LOR	0.02	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

<LOR = below the laboratory limit of reporting
* Historical data range since monitoring commenced in 2014 prior to OMP monitoring commencing.

Consistent with the historical results, monitoring well MW066 reported concentrations of PFHxS+PFOS above the NEMP (HEPA, 2020) Human Health Drinking Water guideline value (0.07 µg/L) and concentrations of PFOS above the 99% Freshwater Ecological criteria (0.00023 µg/L) in all groundwater monitoring events during the monitoring period.

The temporal graphs (**Graph G1** and **G2, Appendix D**) show that PFAS concentrations within MW066 have remained relatively stable since November 2018 with some minor seasonal fluctuations, however, this seasonal trend was not observed consistently on an annual basis with the change of each season.

A non-parametric MK statistical trend analysis was performed for MW066 and is presented in **Appendix E** and summarised in **Table 15** below. Monitoring wells MW012, MW012D and MW021 did not have sufficient data above the LOR to enable statistical analysis to be completed.

Table 15 Source Area 1: Mann-Kendall summary

Location ID	Analyte	Historical range*	Current monitoring period	Mann-Kendall trend	
		Min – Max (µg/L)	Min – Max (µg/L)	Trend	Confidence factor
MW066	PFOA	0.01–0.09	0.02-0.03	Stable	54.8%
	PFOS+PFHxS	0.33-1.71	0.42-0.65	Stable	82.1%

* Historical data range includes data since monitoring commenced in 2017 at MW066 and includes interim/OMP monitoring data.

Monitoring location MW066 presented a *stable trend* for PFOA and PFHxS+PFOS (with a relatively low confidence factor for PFOA).

As seasonal variability was not consistently observed with each change of season at MW066, no additional seasonally filtered MK statistical assessment was completed for this monitoring well.

8.3.3 Northern monitoring wells

Three monitoring wells are located to the north of the Base and north of Source Area 1. The wells are located on the Base and the CTA and screened in the upper aquifer. The three monitoring wells are summarised as:

- MW034: located cross gradient from Source Area 1 (located to the north).
- MW032: located east of MW034 on the north-west boundary of the CTA.
- MW023: located down the inferred hydraulic gradient from Source Area 1, within the CTA.

Historical concentrations of PFOS+PFHxS and PFOA in groundwater from the above listed locations are summarised in **Table 16** below, and presented in full as **Table T2** (**Appendix B)**. Temporal graphs (**Graph G3** and **G4, Appendix D**) present reported concentrations of PFOS+PFHxS and PFOA overtime within monitoring wells MW032 and MW034. As presented in **Table 14** below, MW023 (and contingency/alternative well MW024) has consistently reported PFAS concentrations below the LOR and hence is not presented in the temporal graphs.

Table 16 Northern monitoring wells: PFAS summary results (µg/L)

Well ID	Analyte	Historical range		Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP Monitoring period (November 2021 – March 2023)			
		Min	Max	Min	Max	Nov-21	Apr/ May-22	Sep-22	Mar-23
MW032	PFOS+ PFHxS	<LOR	<LOR	0.01	0.09	0.08	0.09	0.08	0.09
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW034	PFOS+ PFHxS	0.04	0.10	0.02	0.21	0.12	0.09	0.11	0.10
	PFOA	<LOR	<LOR	<LOR	0.03	0.01	<LOR	<LOR	<LOR
MW023	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR[1]	<LOR[1]	<LOR[1]	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR[1]	<LOR[1]	<LOR[1]	<LOR

<LOR = below the laboratory limit of reporting
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.
[1] Results taken from MW024 as an alternate well to MW023

Monitoring wells MW032 and MW034 reported concentrations of PFHxS+PFOS above the NEMP (HEPA, 2020) Human Health Drinking Water guideline value (0.07 µg/L) and concentrations of PFOS above the 99% Freshwater Ecological criteria (0.00023 µg/L) in all groundwater monitoring events during the monitoring period.

Reported concentrations of PFOS+PFHxS and PFOS within MW034 have consistently been at or above the Human Health Drinking Water guideline value (0.07 µg/L) since May 2019. A spike in PFOS+PFHxS and PFOS concentrations were reported above historical range in November 2020 at this location, however returned and remained within historical range following on from this monitoring event (April 2021 onwards).

The temporal graphs (**Graphs G3** and **G4** (**Appendix D**) show that PFAS concentrations at both MW032 and MW034 experience seasonal fluctuations, notably an increase in PFAS concentrations during the dry season at MW034 and an increase following the wet season at MW032.

A non-parametric MK statistical analysis was performed for MW032 and MW034 and is presented in **Appendix E** and summarised in **Table 17**. Monitoring well MW023 did not have sufficient data above the LOR to enable statistical analysis to be completed. Further, MW032 PFOA results were excluded from the statistical assessment as it did not have sufficient data above the LOR to enable statistical analysis.

Table 17 Northern monitoring wells: Mann-Kendall summary

Location ID	Analyte	Historical range*	Current monitoring period	Mann-Kendall trend	
		Min – Max (µg/L)	Min – Max (µg/L)	Trend	Confidence factor
All applicable data					
MW032	PFOA	<LOR	<LOR	NA	
	PFOS+PFHxS	<LOR-0.09	0.80-0.90	Increasing	96.4%
MW034	PFOA	<LOR-0.03	<LOR-0.01	No Trend	70.4%
	PFOS+PFHxS	0.02-0.21	0.09-0.12	Increasing	98.7%

Table 18 Northern monitoring wells: seasonal Mann-Kendall summary

Location ID	Analyte	Historical range*	Current monitoring period	Mann-Kendall trend	
		Min – Max (µg/L)	Min – Max (µg/L)	Trend	Confidence factor
Seasonally filtered data					
MW032 wet season	PFOA	<LOR	<LOR	NA	
	PFOS+PFHxS	<LOR-0.08	0.90	Increasing	99.2%
MW032 dry season	PFOA	<LOR	<LOR	NA	
	PFOS+PFHxS	0.01-0.09	0.80	No Trend	50.0%
MW034 wet season	PFOA	<LOR	<LOR-0.03	Stable	37.9%
	PFOS+PFHxS	0.07-0.10	0.09-0.10	No Trend	64.0%
MW034 dry season	PFOA	<LOR-0.03	<LOR-0.01	No Trend	64.0%
	PFOS+PFHxS	0.02-0.21	0.11-0.12	No Trend	86.4%

<LOR = below the laboratory limit of reporting
NA = Not analysed, insufficient data above the LOR to enable statistical analysis to be completed
* Historical data range includes data since monitoring commenced in 2017 and includes OMP monitoring data.

The MK statistical analysis trend for PFOS+PFHxS concentrations for both MW032 and MW034 were reported to be *increasing* (with a confidence factor of 96.4% and 98.7%, respectively). Given that the concentrations being assessed are near the LOR, the trends obtained are considered to be of limited consequence.

Given that there may be seasonal influence at both monitoring locations, additional MK analysis was completed by separating the data for dry and wet seasons (**Table 17**). It is noted that this seasonal assessment (**Table 18**) only considered data which conformed to the accepted end of wet and end of dry monitoring periods. With the identified dataset limitations, between five and six sampling points were considered by each of the seasonal MK assessments.

From the seasonally filtered dataset, the MK statistical analysis for MW032 held an *increasing* trend for PFOS+PFHxS in the wet season (with a confidence factor of 99.2%), with *no trend* observed in the dry season. Whereas the seasonally filtered analysis for PFOS+PFHxS concentrations at MW034 reported that both dry and wet seasons were holding *no trend*.

The seasonal filtered MK statistical analysis for MW032 further supports the seasonal trend observed in the temporal graphs (**Graph G4** in **Appendix D**) of increasing PFOS+PFHxS concentrations at MW032 following the wet season, indicating that there might be some vertical migration of contamination within the vicinity of this location driven by increased rainfall.

It is noted, due to the limitations of the dataset, the results obtained from seasonally filtered testing should be considered to be of low reliability until additional sampling data from future sampling events is collected.

8.3.4 Source Areas 2 and 3

There are five monitoring wells screened in the upper- and lower-Bathurst Island Formation units located up-gradient, within and down-gradient of Source Area 2 and 3. The five monitoring wells are summarised as:

- MW080: located up the inferred groundwater hydraulic gradient from Source Area 2 and 3, screened in the upper aquifer.
- MW004 and MW004D: located at Source Area 2 and screened in the upper and lower-aquifer unit, respectively.
- MW031 and MW018: located down the inferred groundwater hydraulic gradient from Source Area 2, screened in the upper aquifer.

Historical concentrations of PFOS+PFHxS and PFOA in groundwater from the above listed locations are summarised in **Table 19** below, and presented in full as **Table T2** (**Appendix B)**. A temporal graph (**Graph G5** in **Appendix D**) presents reported concentrations of PFOS+PFHxS overtime within monitoring wells MW031, MW080 and MW004. As presented in **Table 19** below, wells MW004D and MW018 have consistently reported PFOS+PFHxS concentrations below the LOR and hence are not presented in the temporal graph. Further, a temporal graph is not presented for PFOA as all wells in the vicinity of Source Area 2 and 3 have consistently reported concentrations below the LOR.

Table 19 Source Area 2 and 3: PFAS summary results (µg/L)

Well ID	Analyte	Historical range*		Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)			
		Min	Max	Min	Max	Nov-21	Apr-22	Sep-22	Mar-23
MW004	PFOS+PFHxS	<LOR[1]	0.19	0.07	0.28	0.44	0.05	NA	0.15
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	NA	<LOR
MW004D	PFOS+PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW080	PFOS+PFHxS	<LOR	0.02	0.01	0.12	0.03	<LOR	0.07	0.02
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW018	PFOS+PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW031	PFOS+PFHxS	<LOR	<LOR	<LOR	0.02	<LOR	<LOR	<LOR	0.03
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NA = Not analysed,
<LOR = below the laboratory limit of reporting
Orange shading indicates results above the historical range.
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.
[1] Historical result taken from MW005 as an alternate well to MW004

Monitoring well MW004 reported concentrations of PFOS+PFHxS above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value (0.07 µg/L) in November 2021 and March 2023.

Monitoring wells MW004 and MW080 reported concentrations of PFOS above the 99% Freshwater ecological criteria (0.00023 µg/L) in all groundwater monitoring events during the monitoring period, with the exception of MW080 in April 2022.

The new maximum concentrations of PFOS and PFOS+PFHxS reported at MW004 in November 2021 (**Table 19)** were of the same order of magnitude as historical maximum results, and concentrations were reported lower and within historical ranges in the subsequent monitoring events (April 2022 onwards). It is also noted that the water level at MW004 during the November 2021 event was the lowest recorded historically at the location and may have contributed to the high concentration of PFAS.

Similarly, the new maximum concentrations of PFOS and PFOS+PFHxS reported at MW031 in March 2023 (**Table 19)** are within same order of magnitude as historical maximum results. It should also be noted that all concentrations reported at MW031 have been close to the LOR and therefore the new maximum is considered to be insignificant.

Monitoring well MW004D, screened within the lower aquifer unit within Source Area 2 reported concentrations of PFAS below the LOR, consistent with historical ranges, suggesting limited connectivity between aquifer units and that PFAS may be present primarily in the upper aquifer unit.

In general, the temporal trend analysis graphs (**Graph G5** in **Appendix D**) show that PFOS+PFHxS concentrations in MW004, MW031 and MW080 fluctuate with no clear observable trends. Notable spikes in concentrations have been observed at each location at various times, although no obvious trend is evident with the change of each season.

A non-parametric MK statistical analysis was performed for reported PFOS+PFHxS concentrations for MW004, MW031 and MW080 and is presented in **Appendix E** and summarised in **Table 20** below. Other locations in Source Area 2 (MW004D and MW018) did not have sufficient data above the LOR to enable statistical analysis to be completed.

Table 20 Source Area 2 and 3: Mann-Kendall summary

Location ID	Analyte	Historical range*	Current monitoring period	Mann-Kendall trend	
		Min – Max (µg/L)	Min – Max (µg/L)	Trend	Confidence factor
MW004	PFOS+PFHxS	<LOR[1]-0.28	0.05-0.44	No Trend	53.0%
MW031	PFOS+PFHxS	<LOR-0.02	<LOR-0.03	No Trend	50.0%
MW080	PFOS+PFHxS	<LOR-0.12	<LOR-0.07	No Trend	88.9%

<LOR = below the laboratory limit of reporting
* Historical data range includes data since monitoring commenced in 2017 and includes OMP monitoring data.
[1] Historical result taken from MW005 as an alternate well to MW004.

Monitoring locations MW004, MW031 and MW080 presented no statistical trend for PFOS+PFHxS. As variability was not observed with each season at MW004, MW031 and MW080, no additional seasonally filtered MK statistical assessments were completed for these datasets.

8.3.5 Southern monitoring wells

The Southern Drainage Channel is located in the southern-most extent of the Monitoring Area and comprises of two monitoring locations accessible from public land:

- MW001: located down the inferred groundwater hydraulic gradient of Source Area 2 and 3.
- MW029: located south of Milners Creek and up the inferred groundwater hydraulic gradient of Source Area 2 and 3.
- MW030: located north of Milners Creek approximately 2 metres from the southern boundary fence and down/ cross the inferred groundwater hydraulic gradient of Source Area 2 and 3.

Historical concentrations of PFOS+PFHxS and PFOA in groundwater from the above listed locations are summarised in **Table 21**, and presented in full as **Table T2** (**Appendix B)**.

A temporal graph (**Graph G6** in **Appendix D**) presents reported concentrations of PFOS+PFHxS overtime within monitoring well MW001 and MW030.

As presented in **Table 21** below, monitoring well MW029 has consistently reported PFOS+PFHxS concentrations below the LOR and hence not presented in the temporal graph. Further, a temporal graph is not presented for PFOA as all southern monitoring wells have in general consistently reported concentrations below or equal to the LOR.

Table 21 Southern monitoring wells: PFAS summary results (µg/L)

Well ID	Analyte	Historical range		Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)			
		Min	Max	Min	Max	Nov-21	Apr-22	Sep-22	Mar-23
MW001	PFOS+ PFHxS	0.15	0.20	0.12	0.35	0.19	0.12	0.17	0.15
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW029	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW030	PFOS+ PFHxS	0.14	0.14	0.12	0.23	0.40	0.14	0.16	0.11
	PFOA	<LOR	<LOR	0.01	0.01	0.01	<LOR	<LOR	<LOR

<LOR = below the laboratory limit of reporting
Orange shading indicates results above the historical range.
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.

Consistent with historical results, MW001 and MW030 reported concentrations of PFOS+PFHxS above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value (0.07 µg/L) and PFOS above the 99% Freshwater ecological criteria (0.00023 µg/L) in all groundwater monitoring events during the monitoring period.

Monitoring well MW030 is located hydraulically down-gradient of Source Area 3 with comparable concentrations noted in adjacent/up-gradient location MW001, suggesting the concentrations at this location are due to up-gradient impacts. The new maximum concentrations of PFOS and PFOS+PFHxS reported at MW030 in November 2021 (**Table 21**) were of the same order of magnitude as historical results, and concentrations were reported lower and within historical range in the subsequent monitoring events (April 2022 onwards). The historically high PFOS+PFHxS concentration recorded in November 2021 may be the result of low groundwater elevations recorded during the sampling event where reduced water volumes in the aquifer may have a concentrating effect on some contaminants such as PFAS compounds in locations downgradient of source areas.

Variability in PFOS+PFHxS data since monitoring commenced in 2017 is evident in the temporal graph at MW001 and MW030 (**Graph G6** in **Appendix D**). A spike in PFOS+PFHxS concentrations were observed at MW001 in April 2020, and MW030 in late November 2021, however less variability has been observed at these locations since this time. In general, seasonal variation is evident at both locations, notably an increase in PFAS concentrations during the dry season possibly correlating with low groundwater levels.

A non-parametric MK statistical analysis was performed for reported PFOS+PFHxS concentration for monitoring locations MW001 and MW030 and is presented in **Appendix** E and summarised in **Table 22** below. Monitoring well MW029 did not have sufficient data above the LOR to enable statistical analysis to be completed.

Table 22 Southern monitoring wells: Mann-Kendall summary

Location ID	Analyte	Historical range*	Current monitoring period	Mann-Kendall trend	
		Min – Max (µg/L)	Min – Max (µg/L)	Trend	Confidence factor
All applicable data					
MW001	PFOS+PFHxS	0.12-0.35	0.12-0.19	Stable	82.1%
MW030	PFOS+PFHxS	0.12-0.23	0.11-0.40	Stable	75.3%

Table 23 Southern monitoring wells: seasonal Mann-Kendall summary

Location ID	Analyte	Historical range*	Current monitoring period	Mann-Kendall trend	
		Min – Max (µg/L)	Min – Max (µg/L)	Trend	Confidence factor
Seasonally filtered data					
MW001 Wet season	PFOS+PFHxS	0.12-0.35	0.12-0.15	Stable	64.0%
MW001 Dry season	PFOS+PFHxS	0.20-0.23	0.17-0.19	Stable	75.8%
MW030 Wet season	PFOS+PFHxS	0.12-0.18	0.11-0.14	Stable	81.5%
MW030 Dry season	PFOS+PFHxS	0.15-0.23	0.16-0.40	Stable	40.8%

* Historical data range includes data since monitoring commenced in 2017 and includes OMP monitoring data.

Given that there may be seasonal influence at both monitoring locations MW001 and MW030, additional MK analysis was completed by separating the data for dry and wet seasons (as presented in **Table 22**). It is noted that this assessment only considered data which conformed to the accepted end of wet and end of dry monitoring periods. Within the dataset limitations, between five and six sampling points were considered by each of the seasonal MK assessments.

The MK statistical analysis trend of PFOS+PFHxS concentrations in MW001 and MW030 was reported to be *stable* (with a confidence factor of 82.1% and 75.4% respectively). Seasonal analysis (**Table 23**)

of PFOS+PFHxS concentrations reported that both dry and wet seasons were holding *stable* trends. Due to the limitations of the dataset, the results obtained from seasonally filtered testing should be considered to be of low reliability until additional sampling data from future sampling events is collected.

8.3.6 Shoal Bay Receiving Station

Two abstraction bores located within the SBRS, approximately 5.75 kms north of the Base, utilised for potable water purposes, are monitored as part of the OMP, MW112 and MW113.

The SBRS abstraction bores, MW112 and MW113, have not reported PFAS concentrations above LOR for any historical, interim, or OMP monitoring events as shown in **Table 24** below and presented on **Table T2** in **Appendix B**. No graphical representation or statistical analysis have been performed for these locations due to PFAS concentrations reporting below the LOR.

Table 24 On-Base Shoal Bay Receiving Station PFAS summary results (µg/L)

Well ID	Analyte	Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)			
		Min	Max	Nov-21	Apr-22	Sep-22	Mar-23
MW112	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
MW113	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

<LOR = below the laboratory limit of reporting

8.4 Surface water results overview

Surface water results for PFOS+PFHxS compared to assessment criteria are provided in figure series **Figure F5** (**Appendix A**), with PFAS concentrations presented in **Table T4** (**Appendix B**).

The highest concentrations of PFAS reported for the monitoring period were in SW059, located on-Base on the eastern boundary drainage line, and SW123, located off-Base (downstream of SW059) above the confluence of the northern drainage line with Milners Creek. The maximum concentrations of PFOS+PFHxS reported at these two locations during the monitoring period are listed below:

- **On-Base**: SW059, 0.22 µg/L (April 2022) and 0.25 µg/L (March 2023).
- **Off-Base**: SW123, 0.25 µg/L (November 2022) and 0.35 µg/L (March 2023).

New detections above LOR and/or maximum concentrations of PFOS+PFHxS and/or PFOA were reported at two locations during the monitoring period:

- **On-Base**: SW007 (located up-stream of the southern arm of the southern drainage channel), new maximum PFOS+PFHxS concentration reported in March 2023
- **Off-Base**: SW123 (located above the confluence of the northern drainage line with Milners Creek), new maximum PFOS+PFHxS concentration reported in March 2023
- **Off-Base**: SW123, new detection of PFOA concentration above LOR in November 2022 and new maximum PFOA concentration reported in March 2023.

The new maximum concentrations of PFOS+PFHxS reported at SW007 and SW123 in March 2023 were of the same order of magnitude as historical range. However, as no further monitoring has been conducted at these two locations within the monitoring period the significance (if any) of the new maximum concentrations observed cannot be assessed. Additionally, further monitoring is required to assess the significance (if any) of the new detection and maximum PFOA concentrations observed at SW123 in November 2022 and March 2023.

In general, the results indicate that there is variability in concentrations of PFAS in surface water; however, overall PFAS concentrations on-Base and off-Base have remained relatively stable. The overall nature and extent of PFAS in surface water within the Monitoring Area is generally consistent with the understanding presented in the 2021 AIR (AECOM, 2022c). The reported surface water concentrations from the monitoring period and significance of any variation are discussed based on areas of interest in **Section 8.5** below.

8.5 Surface water PFAS temporal trend

8.5.1 Approach to surface water temporal trend analysis

A summary of PFOS+PFHxS and PFOA concentrations (including historical data) and trend analysis results in surface water for the areas of interest specified in **Table 25** below are presented in tabular form and discussed in the following sub-sections (**Section 8.5.2** and **8.5.3**).

Table 25 Summary of surface water monitoring areas

Area of interest	Surface water sampling location ID
Base Drainage Lines	SW001, SW007, SW023, SW028, SW059 and SW075 (located off-Base)
Closed Training Area	SW086, SW091 and SW123

The temporal graphs only include locations which consistently report concentrations of PFOS+PFHxS greater than LOR. Based on this criterion, **Table 26** below summarises the monitoring locations and analytes selected for the temporal graphs for both monitoring areas. Where sample results were less than the LOR, half the LOR was adopted for the graph. Temporal graphs are not presented for PFOA as all location have in general consistently reported concentrations below the LOR.

Table 26 Summary of locations selected for surface water temporal graphs

Area of interest	Graph ID	Analyte	Surface water sampling location ID
Base Drainage Lines	G7	PFOS+PFHxS	SW001, SW007, SW028, SW059 and SW075
Closed Training Area	G8	PFOS+PFHxS	SW086, SW091 and SW123

Surface water temporal graphs are presented in **Appendix D**.

8.5.2 On-Base drainage lines; central, south-east, south-west and eastern boundaries

Five surface water monitoring locations are positioned throughout the Base in drainage lines, and one surface water monitoring location south of the Base boundary and west of Thorngate Road:

- SW001: located up-stream of the confluence with southern drainage channel and down-gradient of Source Area 2 and 3.
- SW007: located up-stream of the southern arm of the southern drainage channel.
- SW023: located at the central drainage line on the Base.
- SW028: located centrally up-stream of the southern drainage channel.
- SW059: located at the eastern boundary drainage line.
- SW075: located in the southern drainage channel and upstream of Milners Creek.

Historical concentrations of PFOS+PFHxS and PFOA in surface water from the above listed locations are summarised in **Table 27** below, and presented in full as **Table T2** (**Appendix B**). A temporal graph (**Graph G7** in **Appendix D**) presents reported concentrations of PFOS+PFHxS overtime within the surface water monitoring locations, with the exception of SW023 which has consistently reported PFOS+PFHxS concentrations below the LOR. A temporal graph is not presented for PFOA as all location have consistently reported concentrations below the LOR.

Table 27 Base Drainage Lines: PFAS summary results (µg/L)

Location ID	Analyte	Historical range		Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)			
		Min	Max	Min	Max	Jan-22	Apr-22	Nov-22	Mar-23
SW001	PFOS+PFHxS	0.05	0.09	<LOR	0.04	0.03	0.02	0.01	0.05
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
SW007	PFOS+PFHxS	<LOR	0.04	<LOR	<LOR	<LOR	<LOR	<LOR	0.06
	PFOA	<LOR	<LOR	<LOR	0.01	<LOR	<LOR	<LOR	<LOR
SW023	PFOS+PFHxS	0.01	0.01	<LOR	<LOR	<LOR	NA[1]	<LOR	NA[1]
	PFOA	0.03	0.03	<LOR	<LOR	<LOR	NA[1]	<LOR	NA[1]
SW028	PFOS+PFHxS	0.18	0.18	<LOR	<LOR	<LOR	NA[1]	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	NA[1]	<LOR	<LOR
SW059	PFOS+PFHxS	0.67	0.67	0.01	0.12	<LOR	0.25	0.03	0.22
	PFOA	0.03	0.03	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
SW075	PFOS+PFHxS	<LOR	0.13	<LOR	0.11	0.03	<LOR	0.01	0.01
	PFOA	<LOR	0.01	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NA = Not analysed,
<LOR = below the laboratory limit of reporting,
Orange shading indicates results above the historical range,
[1] Location dry
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.

With the exception of SW023, all surface water monitoring locations within on-Base drainage lines and the southern drainage line reported concentrations of PFOS+PFHxS above laboratory LORs at least once during the monitoring period. Of note, SW023 and SW028 were reported as dry at least once during the monitoring period (SW023 in April 2022 and March 2023, and SW028 in April 2023).

The following locations reported concentrations of PFOS above the PFAS NEMP (HEPA, 2020) 99% Freshwater ecological criteria (0.00023 µg/L) during the monitoring period:

- SW001 in all monitoring events during the monitoring period
- SW059 in April2022, November 2022 and March 2023
- SW075 in January 2022, November 2022 and March 2023

All three of the above listed locations reported concentrations of PFOS+PFHxS above the LOR but below the adopted PFAS NEMP (HEPA, 2020) recreational criteria.

Surface water sample location SW007 reported a new maximum concentration of PFOS+PFHxS in March 2023 (0.06 µg/L). However, the concentration reported was of the same order of magnitude as historical results (previous maximum of 0.04 µg/L in July 2017). However, as no further monitoring has been conducted at this location within the monitoring period the significance (if any) of the new maximum concentration observed cannot be assessed.

In general, PFAS concentrations obtained during the monitoring period within on-Base drainage lines and the southern drainage channel remained within an order of magnitude of historical results. From review of the temporal trend graphs (**Graph G7** in **Appendix D**), concentrations generally fluctuated with no consistent pattern related to seasonal change, with the exception of SW059 (discussed further below). Overall, this indicates that the PFAS concentrations in surface water adjacent to on-Base source areas is variable.

Sample location SW059, located at the eastern boundary drainage line, has exhibited a slight seasonal variation evident over time, with the reported PFAS concentrations generally higher during end of wet season sampling (refer to **Graph G7** in **Appendix D**). Further, an increase in PFOS+PFHxS concentrations during the end of wet season sampling at this location has been observed since April 2022. While this change is noted, it is not considered significant as concentrations have remained below the historical maximum of 0.67 µg/L reported in February 2018.

Based on the monitoring data, the PFAS concentrations in these areas are variable, with no observable trend.

8.5.3 Closed Training Area

Three surface water monitoring locations are located in the CTA, down-gradient of the Base surface water catchment. The following summarises the locations:

- SW086: located in Milners Creek, downstream of the southern Base catchment.
- SW091: located down stream of SW123 and SW086 and is the most downstream location.
- SW123: located above the confluence of the northern drainage line with Milners Creek.

Historical concentrations of PFOS+PFHxS and PFOA in surface water from the above listed locations are summarised in **Table 28** below, and presented in full as **Table T2** (**Appendix B**). A temporal graph (**Graph G8** in **Appendix D**) presents reported concentrations of PFOS+PFHxS overtime within the surface water monitoring locations. A temporal graph is not presented for PFOA as all location have generally consistently reported concentrations below the LOR.

Table 28 Closed Training Area: PFAS Summary Results (µg/L)

Location ID	Analyte	Historical range		Interim/OMP monitoring (Nov 2018-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)			
		Min	Max	Min	Max	Jan-22	Apr-22	Nov-22	Mar-23
SW086	PFOS+ PFHxS	<LOR	<LOR	<LOR	0.01	<LOR	<LOR	<LOR	0.01
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
SW091	PFOS+ PFHxS	ND	0.08	0.01	0.08	0.02	0.03	0.06	0.01
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
SW123	PFOS+ PFHxS	<LOR	0.21	0.01	0.34	0.03	0.04	0.25	0.35
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	0.01	0.15

<LOR = below the laboratory limit of reporting
Orange shading indicates results above the historical range.
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.

Consistent with historical results, both SW091 and SW123, located within the northern portion of the CTA, reported concentrations of PFOS above the PFAS NEMP (HEPA, 2020) 99% Freshwater ecological criteria (0.00023 µg/L) during the monitoring period. Both locations reported concentrations

of PFOS+PFHxS above the LOR but below the adopted PFAS NEMP (HEPA, 2020) recreational criteria.

Sample location SW086 reported concentrations of PFOS above the PFAS NEMP (HEPA, 2020) 99% Freshwater ecological criteria (0.00023 µg/L) in March 2023.

Sample location SW123, located above the confluence of the northern drainage line with Milners Creek, has reported a general increase in PFOS+PFHxS concentrations since January 2022, in comparison to previous OMP monitoring events (since January 2020). The reported concentration of PFOS+PFHxS at SW123 reached a historical maximum of 0.35 ug/L in March 2023. Further, PFOA (0.01 ug/L) was detected for the first time at this location in November 2022 increasing to 0.15 ug/L in March 2023. Further monitoring is required to assess the significance (if any) of the new detection and/or maximums of PFOS+PFHxS and PFOA concentrations observed at this location.

Of note, in general the concentrations of PFOS+PFHxS at SW123 is in the same order of magnitude as PFOS+PFHxS concentrations reported at SW059 in recent monitoring events (**Graph G7** in **Appendix D**, and discussed in **Section 8.5.2** above), which is located upstream of SW123 within an on-Base eastern drainage line.

In general, the temporal data shows that the PFAS concentrations in surface water at CTA fluctuate with no consistent trend related to start of wet season "first flush" and end of wet seasons events. This is with the exception of SW123, which has historically reported occasional spikes in PFOS+PFHxS concentrations, notably during monitoring events in 2020, 2022, and 2023 (**Graph G8** in **Appendix D**). Further monitoring will provide greater understanding in the PFAS variability in surface water at these locations over time.

8.6 Sediment PFAS temporal trend

8.6.1 Approach to surface water temporal trend analysis

A summary of sediment PFOS+PFHxS and PFOA concentrations (including historical data collected) and trend analysis results for the two areas of interest specified in **Table 29** below are presented in tabular form and discussed in the following sub-sections (**Section 8.6.2** and **8.6.3**).

Table 29 Summary of sediment monitoring areas

Monitoring area	Groundwater monitoring well ID
On-Base and Southern Drainage Channel	SD001, SD007, SD023, SD028, SD059 and SD075 (located off-Base)
Closed Training Area	SD086, SD091 and SD123

Temporal graphs for the monitoring areas outlined in **Table 29** are presented in **Appendix D**.

The temporal graphs only include locations which consistently report concentrations of PFOS+PFHxS greater than LOR. Based on this criterion, **Table 30** summarises the monitoring locations and analytes selected for the temporal graphs for both monitoring areas. Where sample results were less than the LOR, half the LOR was adopted for the graph. Temporal graphs are not presented for PFOA as all location have in general consistently reported concentrations below the LOR.

Table 30 Summary of locations selected for sediment temporal graphs

Monitoring area	Graph ID	Analyte	Groundwater monitoring well ID
Base Drainage Lines	G9	PFOS+PFHxS	SD001, SD028, SD059 and SD075
Closed Training Area	G10	PFOS+PFHxS	SD086, SD091 and SD123

8.6.2 Base drainage lines; central, south-east, south-west and eastern boundaries

Sediment samples have been collected within the on-Base surface water drainage network at 5 key drainage locations where corresponding surface water locations have also been monitored, summarised as:

- SD001: located up-stream of the confluence with the southern drainage channel and down-gradient of Source Area 2 and 3
- SD007: located up-stream of the southern drainage channel.
- SD023: located at the central drainage line on the Base.
- SD028: located centrally up-stream of the southern drainage channel.
- SD059: located at the eastern boundary drainage line.
- SD075: located in the southern drainage channel and upstream of Milners Creek.

Historical concentrations of PFOS+PFHxS and PFOA in sediment from the above listed locations are summarised in **Table 31** below, and presented in full as **Table T2** (**Appendix B)**. A temporal graph for concentrations of PFOS+PFHxS within the sediment monitoring locations is presented in **Graph G7** (**Appendix D**). The temporal graphs do not present results for well SD007 and SD023 as these locations has consistently reported PFOS+PFHxS concentrations below the LOR. A temporal graph is not presented for PFOA as all location have consistently reported concentrations below the LOR.

Table 31 Base drainage lines: PFAS summary results (mg/kg)

Location ID	Analyte	Historical range*		Interim/OMP monitoring (Apr 2019-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)
		Min	Max	Min	Max	Apr 2022
SD001	PFOS+ PFHxS	0.0032	0.0072	<LOR	0.0015	0.0003
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR
SD007	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR
SD023	PFOS+ PFHxS	<LOR	<LOR	<LOR	<LOR	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR
SD028	PFOS+ PFHxS	0.0003	0.0015	0.0004	0.0009	<LOR
	PFOA	<LOR	0.0002	<LOR	<LOR	<LOR
SD059	PFOS+ PFHxS	<LOR	0.0002	<LOR	0.0002	0.0004
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR
SD075	PFOS+ PFHxS	0.0003	0.0014	<LOR	0.0007	0.0013
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR

<LOR = below the laboratory limit of reporting
Orange shading indicates results above the historical range.
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.

Sample locations SD007, SD023 and SD028 reported concentrations of PFOS+PFHxS below the LOR during the monitoring period, consistent with historical results (with the exception of SD028). Sample location SD028 reported concentrations of PFOS+PFHxS below the LOR for the first time since sediment monitoring commenced in 2018.

Sample locations SD001, SD059 and SD075 reported concentrations of PFOS+PFHxS above the LOR during the monitoring period. Concentrations at these locations were within historical range with the exception of SD059 which reported a new maximum concentration of PFOS+PFHxS in April 2022,

however the result is marginally higher than the historic maximum, within the same order of magnitude as historical results.

Temporal graphs indicate limited variability in PFOS+PFHxS concentrations in sediment since the commencement of monitoring.

8.6.3 Close Training Area

Three sediment sample locations are located in the CTA, down-gradient of the Base surface water catchment, where corresponding surface water locations have also been monitored, summarised as:

- SD086: located in Milners Creek, downstream of the southern Base catchment.
- SD091: located down stream of SW123 and SW086 and is the most downstream location.
- SD123: located above the confluence of the northern drainage line with Milners Creek.

Historical concentrations of PFOS+PFHxS and PFOA in sediment from the above listed locations are summarised in **Table 32** below, and presented in full as **Table T2** (**Appendix B)**. A temporal graph for concentrations of PFOS+PFHxS within the sediment monitoring locations is presented in **Graph G8** (**Appendix D**). A temporal graph is not presented for PFOA as all location have consistently reported concentrations below the LOR.

Table 32 Close Training Area: PFAS summary results (mg/kg)

Location ID	Analyte	Historical range		Interim/OMP monitoring (Apr 2019-Apr 2021)		OMP monitoring period (Nov 2021 – Mar 2023)
		Min	Max	Min	Max	Apr 2022
SD086	PFOS+ PFHxS	0.0008	0.0008	<LOR	<LOR	0.005
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR
SD091	PFOS+ PFHxS	0.0012	0.0017	<LOR	0.0002	<LOR
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR
SD123	PFOS+ PFHxS	0.0022	0.0072	ND	0.0004	0.0007
	PFOA	<LOR	<LOR	<LOR	<LOR	<LOR

<LOR = below the laboratory limit of reporting
Orange shading indicates results above the historical range.
* Historical data range since monitoring commenced in 2017 prior to OMP monitoring commencing.

Monitoring locations SD086 and SD123 reported concentrations of PFOS+PFHxS marginally above LORs, within historical range (with the exception of SD086). Sample location SD086 reported a new maximum concentration of PFOS+PFHxS in April 2023, however within the same order of magnitude as historical results.

9.0 Conceptual site model

The CSM was developed during the investigation stages (Senversa, 2018a) and summarised in the PMAP (Defence, 2018). The CSM summarises the linkages between sources, exposure pathways and receptors.

The OMP monitoring between November 2021 and March 2023 as discussed in this report has provided additional data to further understand the nature and magnitude of PFAS concentrations in groundwater, surface water and sediment. Key observations included:

- PFAS concentration in groundwater exceed the adopted human health criteria in on-Base wells MW066 (Source Area 1), MW004 (Source Area 2), MW034 (northern monitoring well) and MW001 (southern monitoring well).
- PFAS concentrations were generally within historical range within groundwater, surface water and sediment. It is noted, whilst PFAS concentrations were reported greater than historical maximums at MW004, MW030, MW031, SW007, SW123, SD059 and SD086 within the monitoring period, they were within the same order of magnitude as the historical dataset. Further, subsequent monitoring completed at MW004 and MW030 reported concentrations back within historical ranges. Overall, the new maximum PFAS concentrations reported at MW004, MW030, MW031, SW007, SW123, SD059 and SD086 do not currently change the understanding of the CSM as described in the DSI.
- MK trend analysis of groundwater monitoring data from different locations indicated generally stable or inconclusive trends. Increasing trends were limited to two locations, MW034 (located on-Base cross gradient from Source Area 1) and MW032 (located off-Base east of MW034 on the north-west boundary of the CTA). It is noted, PFAS concentrations at these two locations are close to the LOR and marginally above the adopted human health assessment criteria. Further data is required to understand temporal changes at these two locations.
- PFAS concentrations detected in groundwater in the vicinity of Source Areas 2 and 3 (in particular at MW030), remained relatively low and do not currently change the understanding of the CSM as described in the DSI.
- PFAS concentrations are present in groundwater in five of ten off-Base locations (MW024, MW029, MW030, MW031 and MW032). The concentrations reported are above the adopted human health drinking water criteria at two of the five locations (MW030 and MW032) however generally within historical range.
- PFAS concentrations in surface water both on- and off-Base in general have appeared to remained stable, below the adopted human health recreational criteria and generally close to the LOR.

The PFAS concentration ranges (presented for PFOS+PFHxS) for groundwater and surface water/sediment monitoring locations, reported during the OMP monitoring period are shown in Figure series **Figure F4** to **Figure F6** (**Appendix A**).

The pathways for PFAS exposure and risks to human health as presented in the HHRA (Senversa, 2018b) are considered to be remained relevant, and data presented in this report does not suggest any significant changes to the exposure pathways or risks.

When compared to the available historical dataset, data indicates that the magnitude of PFAS impacts in groundwater and surface water is relatively unchanged since the CSM was developed in the DSI (Senversa, 2018a).

The data presented in this report do not change the understanding of the CSM sources, pathways and/or receptors as described during the investigation stages (Senversa, 2018a; Senversa, 2018b) and summarised in the PMAP (Defence, 2018).

10.0 Discussion

10.1 Risk profile

10.1.1 Risk assessment summary

The DSI (Senversa, 2018a) and the HHERA (Senversa, 2018b) concluded that the risks associated with the majority of exposure pathways relating to PFAS originating from Robertson Barracks to human and ecological receptors was low and acceptable, with potentially elevated exposure scenarios identified for aquatic ecosystems from bioaccumulation and human consumption of recreationally caught fish and molluscs. Risk sources associated with the following pathways from the CSM that require monitoring or management as summarised in the PMAP (Defence, 2018) are as follows:

- Shallow groundwater (upper portion of Bathurst Island Formation) impacts within Robertson Barracks. Concentrations of PFAS in shallow groundwater were reported above the drinking water and recreational water human health guidelines at and around the identified Source Areas. The nature and extent of shallow groundwater impacts and whether impacted groundwater is migrating outside of Robertson Barracks is understood.
- Shallow groundwater (upper portion of Bathurst Island Formation) impacts migrating outside of Robertson Barracks. Concentrations of PFAS exceeding the screening values has been identified to the south of Robertson Barracks near to the southern drainage channel at MW030. Groundwater flow direction in this part of the Monitoring Area has been inferred to the south-southeast and no concentrations of PFAS have been detected at MW029 to the south, Should the nature or intensity of land use change and groundwater abstraction occur near to this area, there is the potential for a future risk to off-site users of shallow groundwater. There is also a potential that discharge of groundwater from the upper portion of Bathurst Island Formation could occur to Milners Creek and the southern drainage channel due to high groundwater levels in the Wet season at concentrations exceeding the adopted ecosystem screening values.
- Migration pathways from soil sources at Robertson Barracks. Legacy AFFF was only stored and used in limited areas of Robertson Barracks with higher concentrations generally recorded at and in proximity Source Areas 1 to 3. Given the reported PFAS concentrations in soil and the nature and behaviour of PFAS in the broader environment, soil impacts are likely to present an ongoing source of impacts to groundwater and surface water from infiltration and overland flow, respectively.

10.1.2 Risk profile evaluation

The data collected during OMP monitoring between November 2021 and March 2023 when combined with the 2014-2018 historic data, 2018 – 2019 interim monitoring and 2019-2021 OMP monitoring suggest that the risk profile to human health and ecological receptors within the Monitoring Area is overall unchanged since the publication of the HHERA (Senversa, 2018b). This is based on the following assessment of the OMP data:

Groundwater

- **Nature and extent of groundwater PFAS impacts:** The groundwater plume extents are generally similar to that which was presented in the DSI (Senversa, 2018a). PFAS concentrations are generally highest on-Base in wells in the vicinity of Source Area 1 and Source Areas 2 and 3. The observed increased PFAS concentrations from Source Areas 2 and 3 (MW004), is not considered to be significant and does not change the overall risk profile. Off-Base monitoring wells have PFAS concentrations below the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFOS+PFHxS with the exception of MW030 and MW032 in the southern and northern boundary areas, respectively.
- **Areas of groundwater PFAS concentration change:** The changes in PFAS concentrations in groundwater for the monitoring period are limited and do not constitute a change in risk profile for the Base or the surrounding Monitoring Area. The fundamentals of the previously derived CSM (Senversa, 2018a) are generally supported by the data collected over the monitoring period, as discussed in **Section 9.0**. Where new maximums have been observed during the monitoring period, PFAS concentrations are noted to be in regions where concentrations of the same order of

magnitude are already present, as such the reported concentrations do not constitute a change in risk profile.

Surface water

- **Nature and extent of surface water PFAS impacts:** PFAS concentrations in surface water bodies were generally similar to previous (historical) results. Monitoring location SW123 reported a first-time detection of PFOA, however it is noted this location has reported PFOS+PFHxS previously. All surface water monitoring locations, with the exception of SW023, reported PFOS concentrations above the PFAS NEMP (HEPA, 2020) 99% species protection guideline value of 0.00023 µg/L. The 99% protection level is applied to account for bioaccumulative effects that may manifest over time within the localised food chain. Actual impacts on aquatic biota are not currently understood and utilisation of the 99% protection level functions as a conservative approach to measuring ecological risk. All surface water monitoring locations reported PFOS+PFHxS concentrations below the Recreational Water guideline (HEPA, 2020) value of 2.0 µg/L.
- **Areas of surface water PFAS concentration change:** In general, PFAS concentrations remained within and generally below historical PFAS concentrations for the monitoring period, suggesting no material change in the risk profile for surface water.

Sediment

- **Sediment PFAS impacts:** PFAS concentrations in sediment were generally similar or lower than previous (historical) results.

10.2 Assessment of current OMP

Based on the above review of the data collected during the current monitoring period, there are no significant changes to the understanding of the nature, extent or risks associated with PFAS within the Monitoring Area, or the need for monitoring of additional media.

It is noted that the 2018 OMP was revised in February 2023 for implementation in subsequent monitoring events following the monitoring period reported in this OMR.

11.0 Conclusions

Groundwater, surface water and sediment monitoring were completed between November 2021 and March 2023 in accordance with the SAQP (AECOM, 2022a).

The results for the monitoring period indicate that the nature and extent of PFAS in groundwater, surface water and sediment are consistent with previous findings.

Variation in PFAS concentrations were observed and likely due to the seasonal variability of Darwin's wet and dry seasons. In general, PFAS concentrations were within historical ranges within groundwater, surface water and sediment. Concentrations of PFAS in groundwater indicated generally stable or inconclusive trends, with increasing trends limited to two locations (namely MW034 and MW032), however concentrations at these two locations are close to the LOR and marginally above the adopted human health drinking water criteria. Further data collected from both locations under the OMP is required to understand temporal changes at these two locations.

The CSM was reviewed, and based on the results presented within this report, no changes were identified to source, pathway or receptors at the base and within the Monitoring Area.

Based on the data collected during the monitoring period, the risk profile has not changed within the Monitoring Area.

The monitoring conducted over the monitoring period is considered to have met the objectives of the SAQP and the OMP. The groundwater monitoring network is considered generally appropriate and sufficient for the program objectives.

12.0 References

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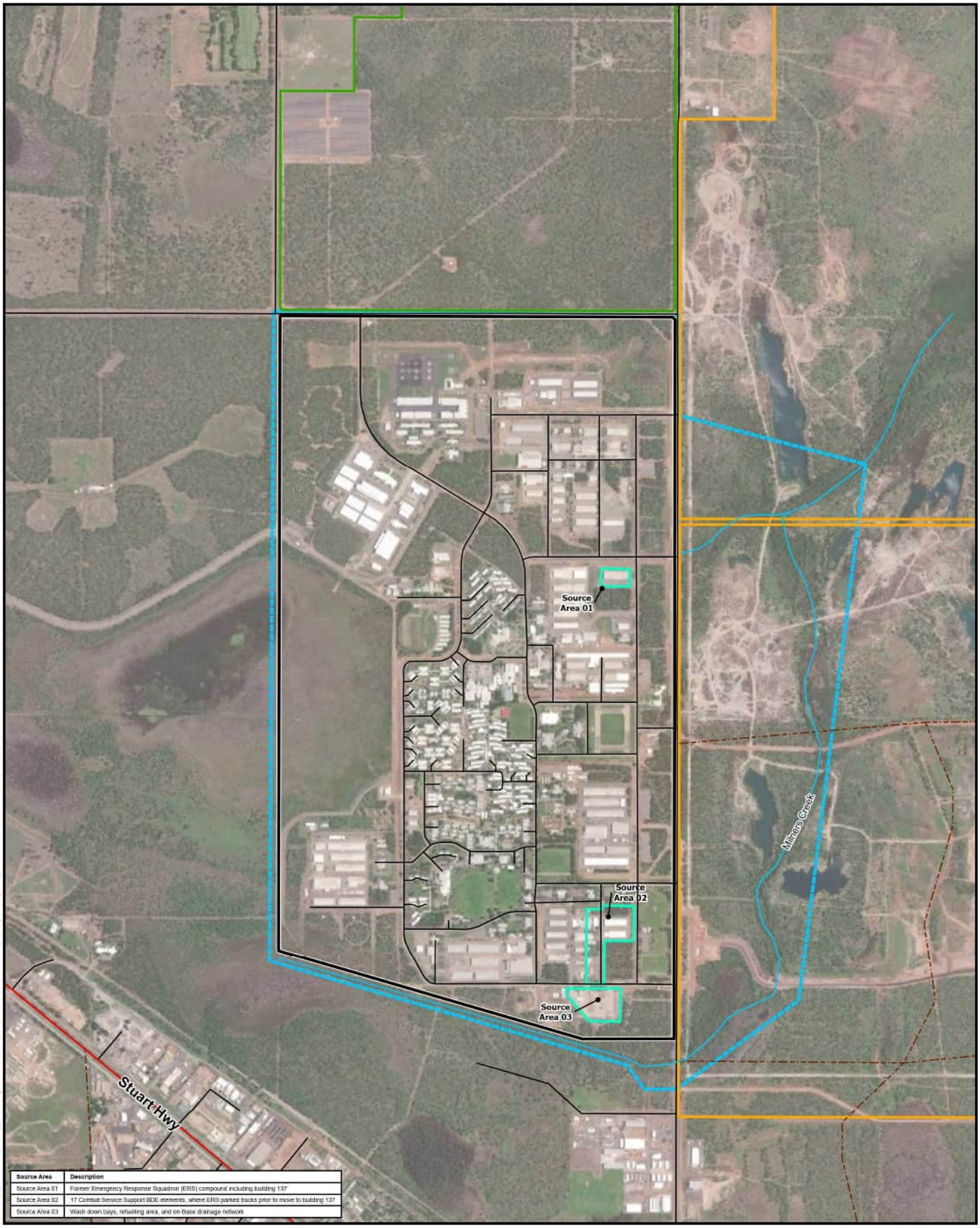
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Senversa, 2018b. Human Health and Ecological Risk Assessment. 30 August 2018.

Senversa, 2019. Ongoing Monitoring Report October 2018 to May 2019 - Robertson Barracks.

Appendix A

Figures



Source Area	Description
Source Area 01	Former Emergency Response Squadron (ERS) compound including building 137
Source Area 02	17 Combat Service Support BDE elements, where ERS parked trucks prior to move to building 137
Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

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LEGEND

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
DW data AECOM 2019

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report
(November 2021 – March 2023)

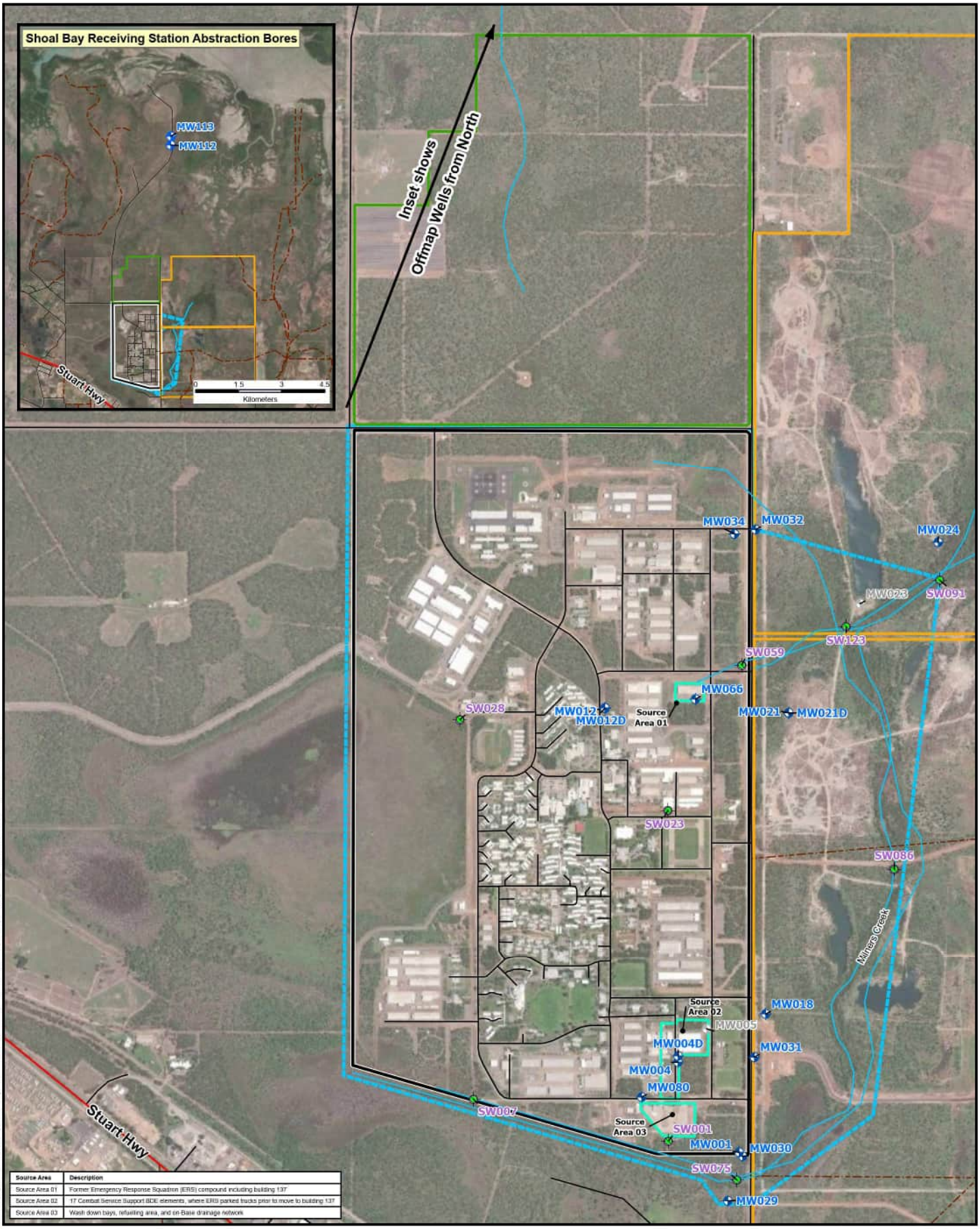
Monitoring Area

PROJECT ID	60612561
CREATED BY	STUTTA
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION:	

Figure
F1

A3 size

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Source Area	Description
Source Area 01	Former Emergency Response Squadron (ERS) compound including building 137
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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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LEGEND

- Groundwater Monitoring Locations
- Surface Water Monitoring Locations
- Sediment Monitoring Locations
- Dry/Damaged/Blocked Locations
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
DSK data AECOM 2019

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)

Monitoring Locations

PROJECT ID	60612561
CREATED BY	STUTTA
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION	1

Figure **F2**

A3 size

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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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LEGEND

- Groundwater Monitoring Locations
- Dry/Damaged/Blocked Locations
- Inferred Groundwater Level
- Inferred Flow Direction
- 175.44 Inferred Groundwater Level (mAHD)
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Road
- Track

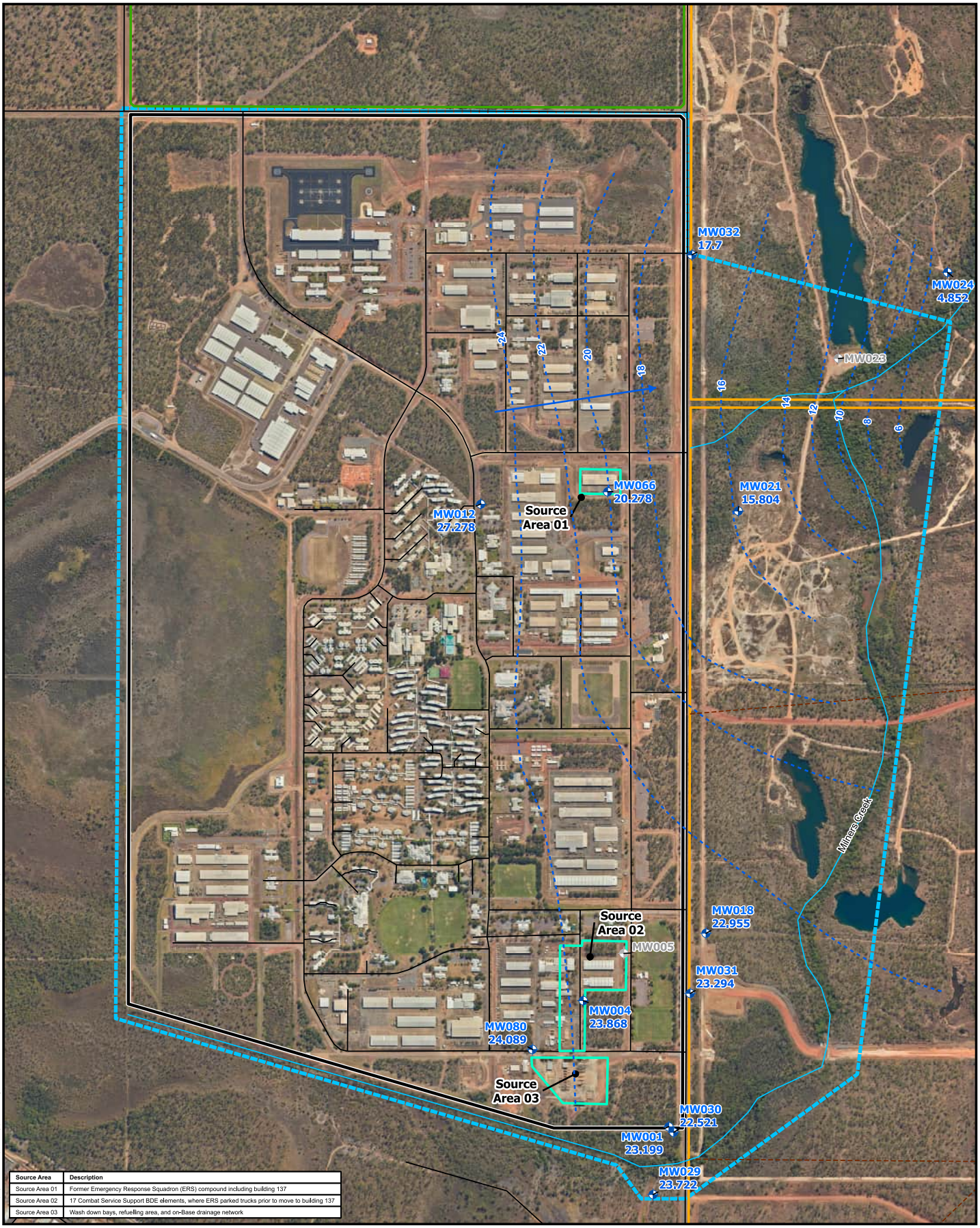
Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Inferred Groundwater Contours November 2021

PROJECT ID	60612561
CREATED BY	STUTTA
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION	1

Figure F3A

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Source Area	Description
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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

1:10,000 (when printed at A3)

LEGEND

- Groundwater Monitoring Locations
- Dry/Damaged/Blocked Locations
- 175.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level Contour
- Inferred Flow Direction
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Road
- Track
- Watercourse

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Inferred Groundwater Contours April 2022

PROJECT ID	60612561
CREATED BY	STUTTA
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION:	1

Figure
F3B

A3 size

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Source Area	Description
Source Area 01	Former Emergency Response Squadron (ERS) compound including building 137
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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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metres

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LEGEND

- Dry/Damaged/Blocked Locations
- Groundwater Monitoring Locations
- 75.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level
- Inferred Flow Direction
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Road
- Track

Note:
- MW004D, MW012D, MW021D, MW034 not included in contouring.
- Millner Creek to the south of the Base influences nearby groundwater flow direction, however overall groundwater flow direction is to the north-east.

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Inferred Groundwater Contours September 2022

PROJECT ID	60612561
CREATED BY	STUTTA
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION:	1

Figure
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Source Area	Description
Source Area 01	Former Emergency Response Squadron (ERS) compound including building 137
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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

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LEGEND

- Groundwater Monitoring Locations
- Dry/Damaged/Blocked Locations
- 75.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level
- Inferred Flow Direction
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Road
- Track

Note:
- MW001, MW004D, MW012D, MW021D, MW029, MW030, MW032, MW034 not included in contouring.
- Millner Creek to the south of the Base influences nearby groundwater flow direction, however overall groundwater flow direction is to the north-east.

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Inferred Groundwater Contours March 2023

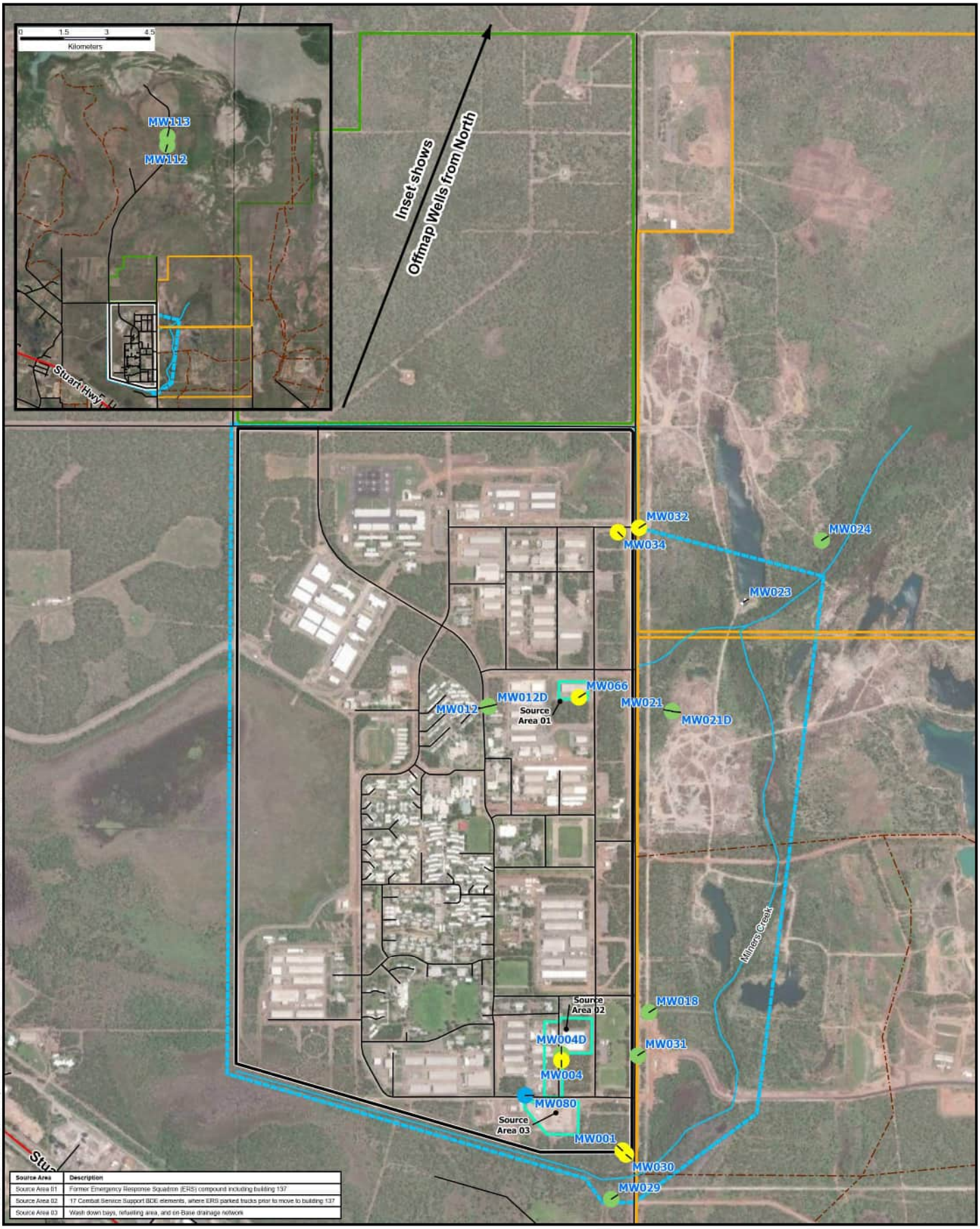
PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION:	1

Figure F3D

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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

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LEGEND

Dry*

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to 0.07 µg/L
- >0.07 µg/L to 1 µg/L

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Note: Human health based guidance for drinking water: 0.07 µg/L.
* Monitoring location was dry during November 2021 sampling event.

Data sources:
Base data NT Gov 2019
DW data AECOM 2021

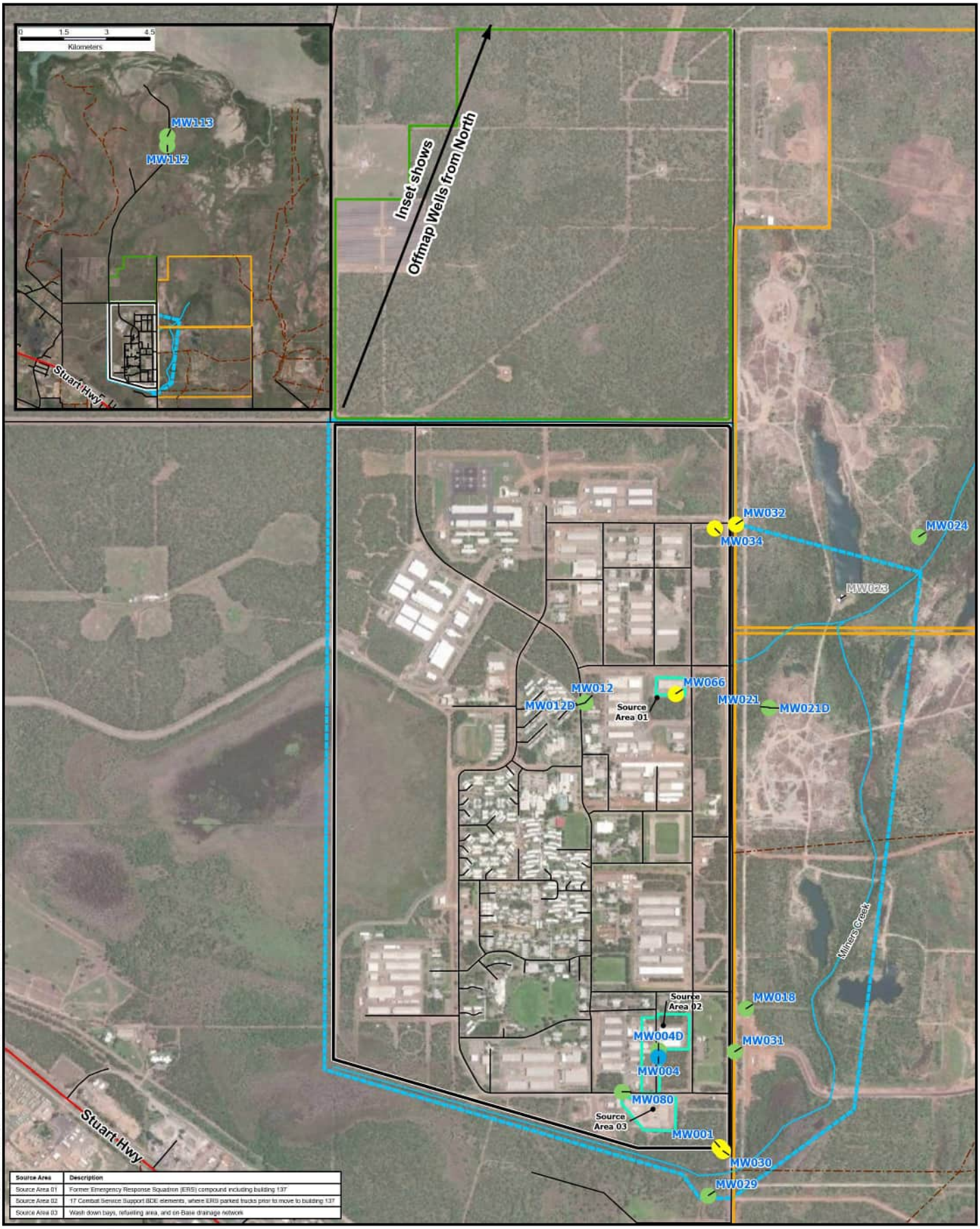
Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Groundwater Analytical Results PFOS+PFHxS November 2021

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Figure
F4A

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Source Area	Description
Source Area 01	Former Emergency Response Squadron (ERS) compound including building 137
Source Area 02	17 Combat Service Support BDE elements, where ERS parked trucks prior to move to building 137
Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:14,000 (when printed at A3)

LEGEND

Damaged*

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to 0.07 µg/L
- >0.07 µg/L to 1 µg/L

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Note: Human health based guidance for drinking water: 0.07 µg/L

Data sources:
Base data NT Gov 2019
GW data AECOM 2021

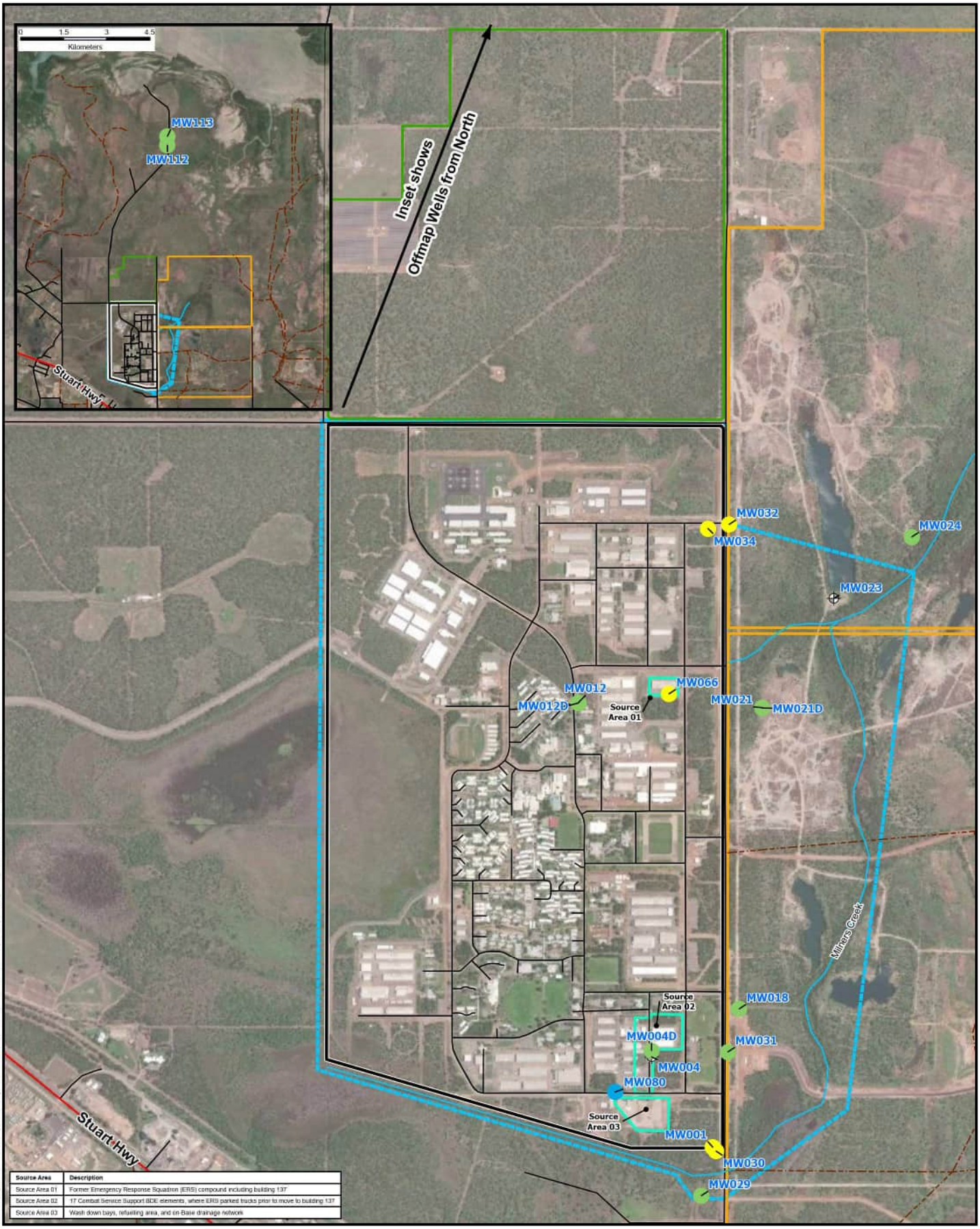
Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Groundwater Analytical Results PFOS+PFHxS April/May 2022

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Figure
F4B

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0 125 250 500

metres

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LEGEND

- Damaged/Dry*;

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to 0.07 µg/L
- >0.07 µg/L to 1 µg/L

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Note: Human health based guidance for drinking water: 0.07 µg/L

Data sources:
Base data NT Gov 2019
GW data AECOM 2021

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Groundwater Analytical Results PFOS+PFHxS September 2022

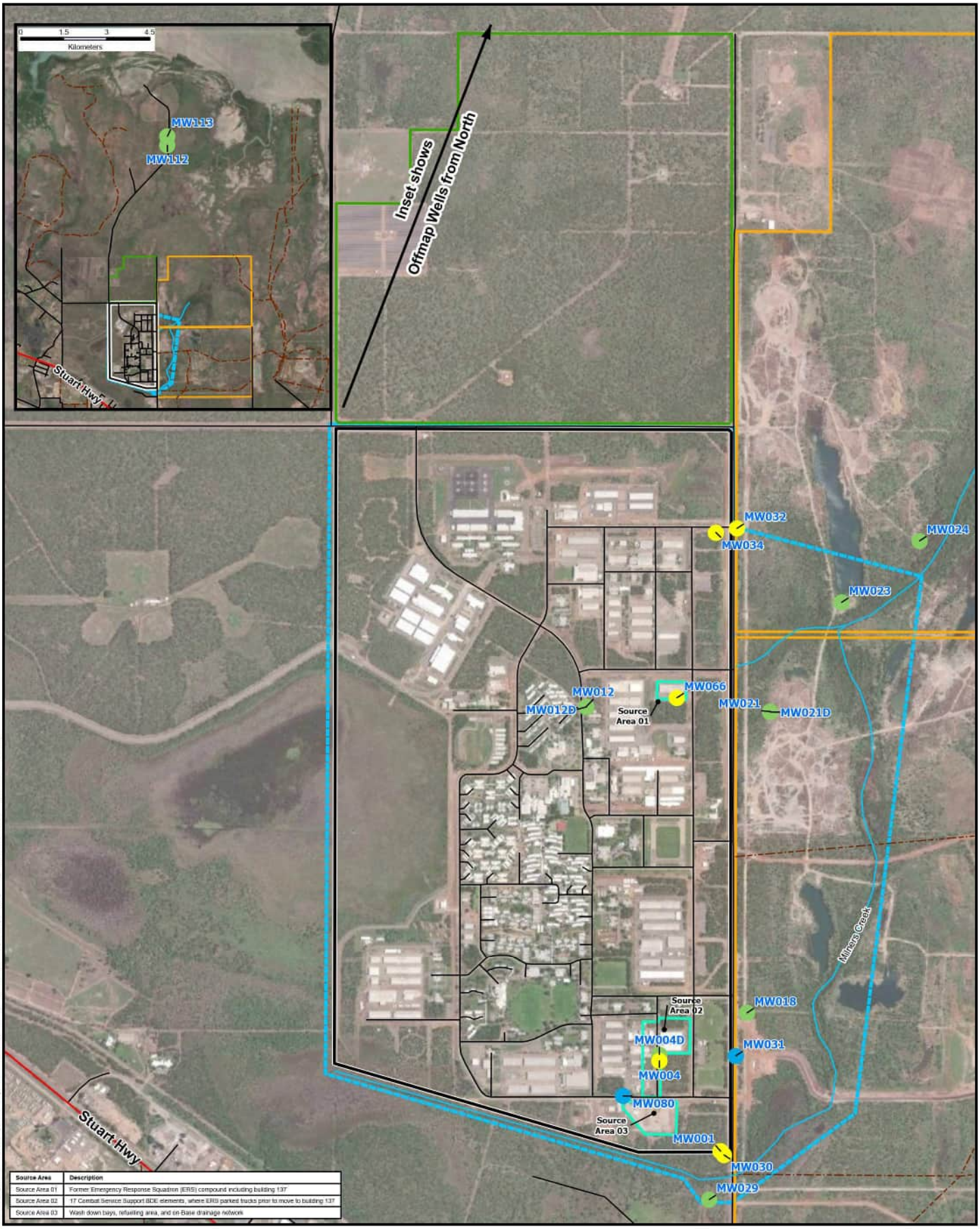
PROJECT ID	60612561
CREATED BY	STUTTA
LAST MODIFIED	STUTTA - 09 JAN 2024
VERSION:	1

Figure
F4C

A3 size

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Source Area	Description
Source Area 01	Former Emergency Response Squadron (ERS) compound including building 137
Source Area 02	17 Combat Service Support BDE elements, where ERS parked trucks prior to move to building 137
Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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0 125 250 500

metres

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LEGEND

Sum of PFOS and PFHxS Concentrations
- <LOR
- LOR to 0.07 µg/L
- >0.07 µg/L to 1 µg/L

- Monitoring Area
- Source Area

Site Layout
- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Road
- Track
- Highway

Note: Human health based guidance for drinking water: 0.07 µg/L

Data sources:
Base data NT Gov 2019
DW data AECOM 2021

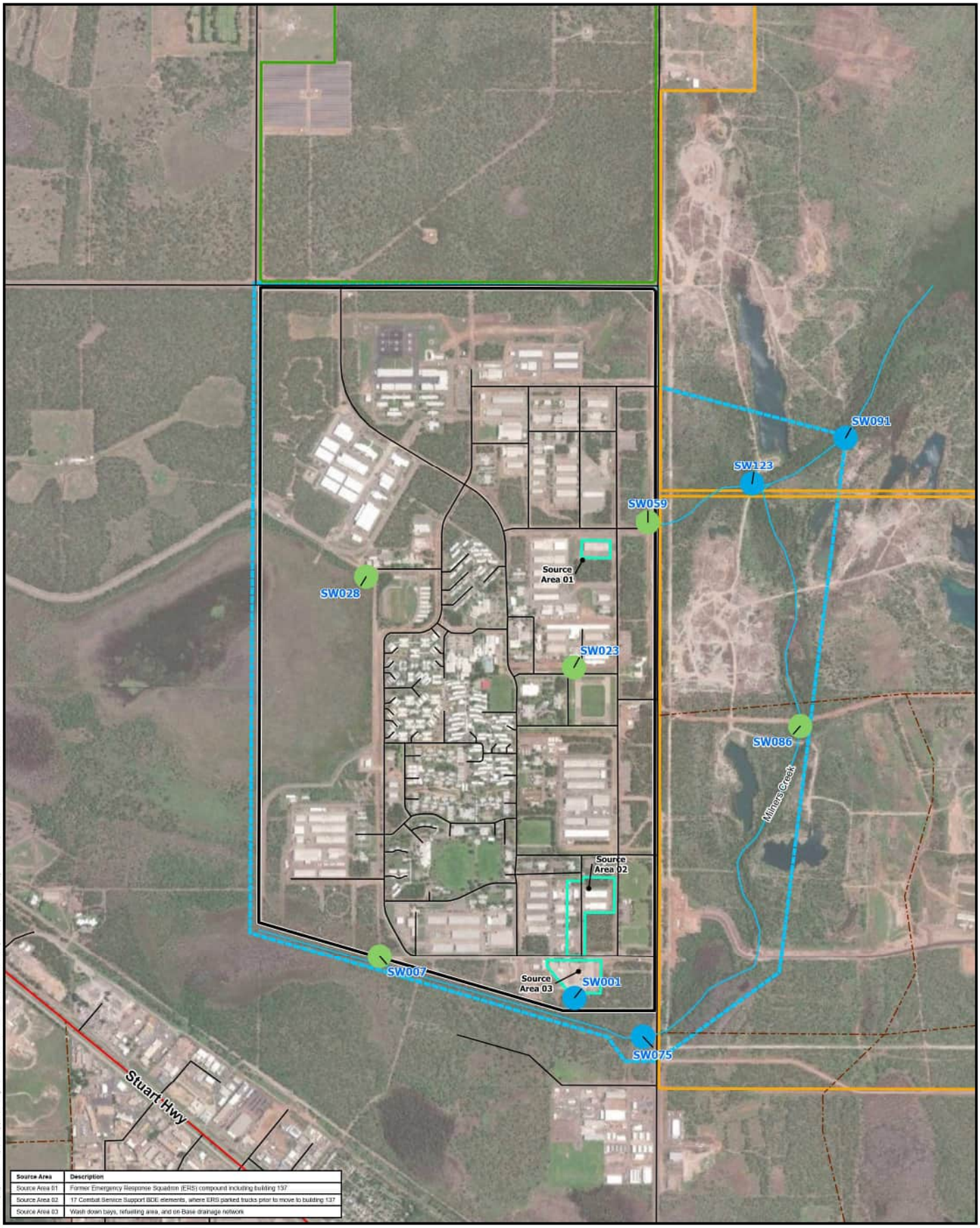
Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Groundwater Analytical Results PFOS+PFHxS March 2023

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VERSION:	1

Figure **F4D**

A3 size

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Source Area	Description
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Source Area 02	17 Combat Service Support BDE elements, where ERS parked trucks prior to move to building 137
Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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0 125 250 500

metres

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LEGEND

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to 0.1µg/L
- >0.1µg/L to 2µg/L

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
DW data AECOM 2021

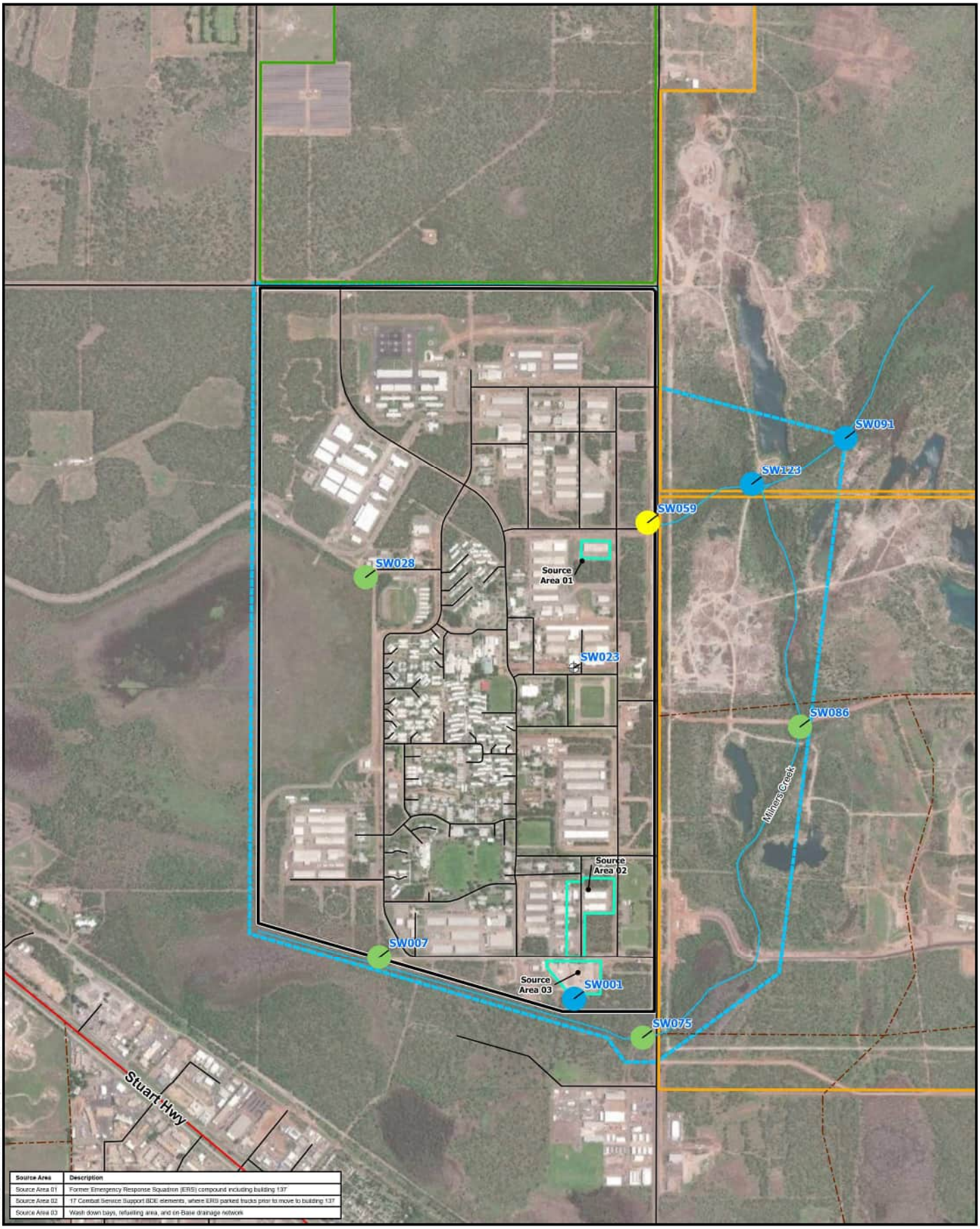
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Ongoing Monitoring Report (November 2021 – March 2023) - Surface Water Analytical Results PFOS+PFHxS January 2022

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Figure F5A

A3 size

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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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0 125 250 500

metres

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LEGEND

- Dry/Damaged/Blocked Locations

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to 0.1µg/L
- >0.1µg/L to 2µg/L

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Note: Human health based guidance for drinking water: 0.07 µg/L.
* Surface Water location was Dry during April 2022 Sampling Event.

Data sources:
Base data NT Gov 2019
GW data AECOM 2021

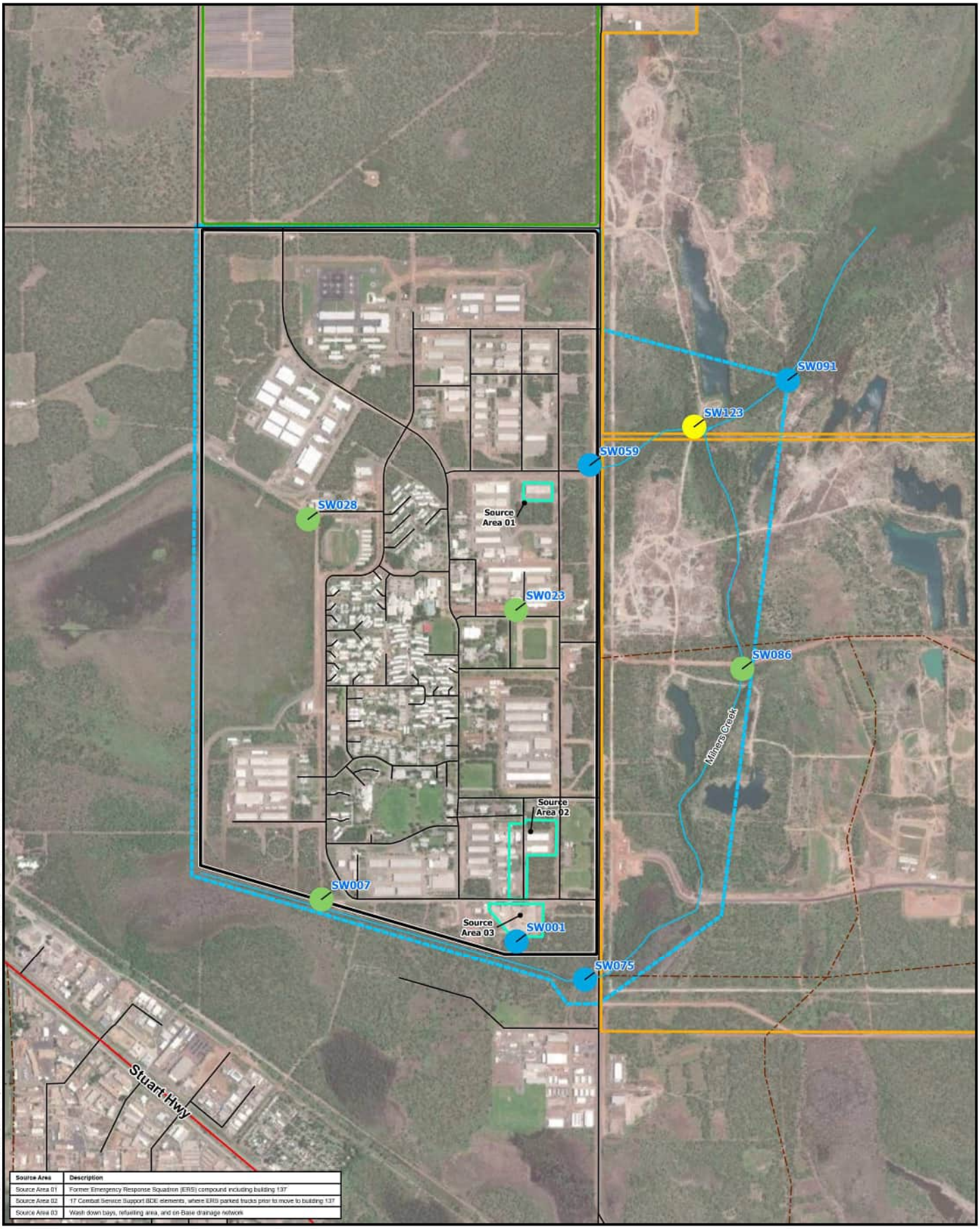
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Ongoing Monitoring Report (November 2021 – March 2023)
- Surface Water Analytical Results PFOS+PFHxS April 2022

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VERSION:	1

Figure F5B

A3 size

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Source Area 03	Wash down bays, refuelling area, and on-Base drainage network

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0 125 250 500

metres

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LEGEND

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to 0.1µg/L
- >0.1µg/L to 2µg/L

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2021

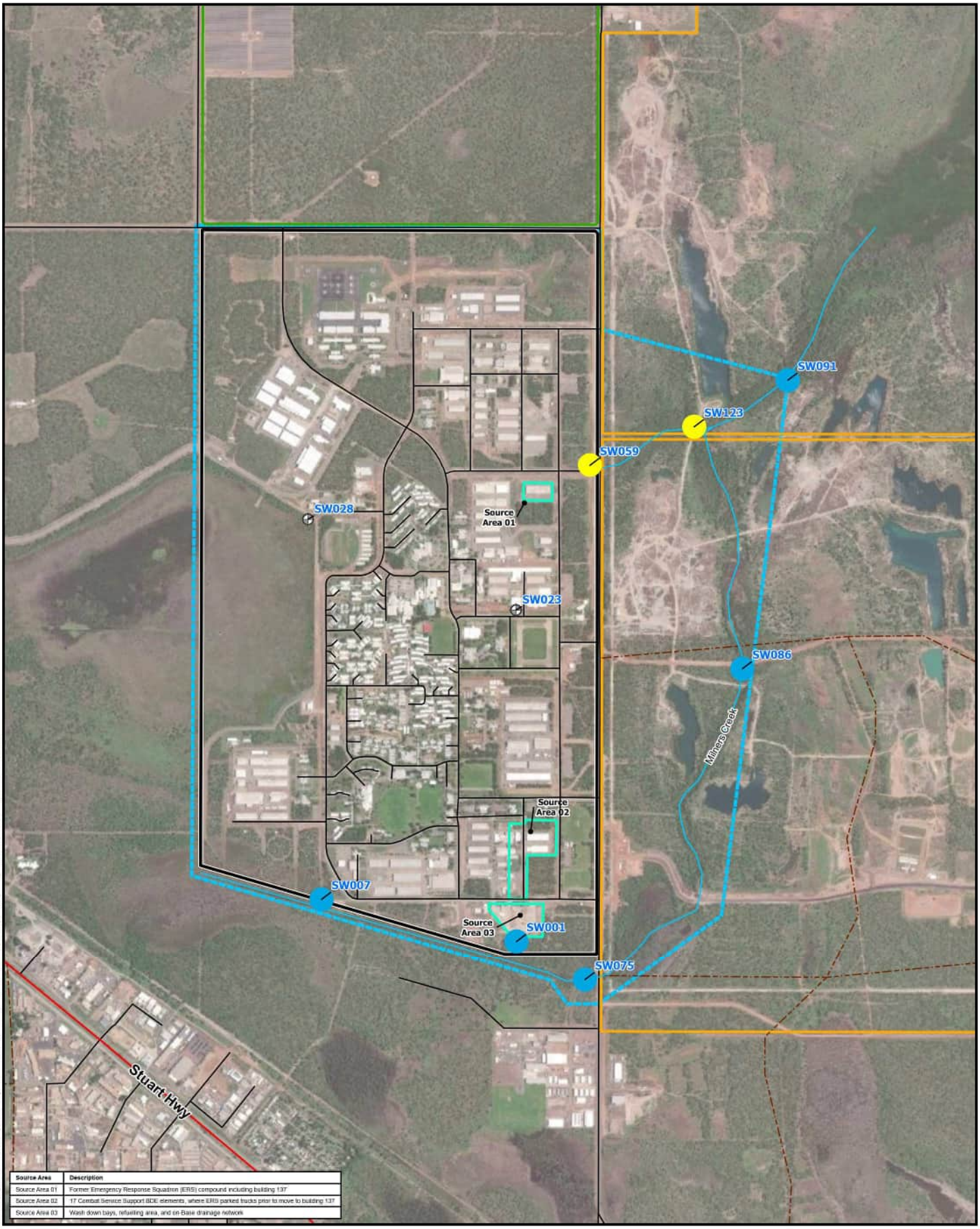
Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Surface Water Analytical Results PFOS+PFHxS November 2022

PROJECT ID	60612561
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Figure **F5C**

A3 size

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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

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LEGEND

- Dry/Damaged/Blocked Locations
- **Sum of PFOS and PFHxS Concentrations**
  - <LOR
  - LOR to 0.1µg/L
  - >0.1µg/L to 2µg/L
- Monitoring Area
- Source Area
- **Site Layout**
  - Robertson Barracks
  - Close Training Area
  - Marksmanship Training Range
- Watercourse
- Road
- Track
- Highway

Note: Human health based guidance for drinking water: 0.07 µg/L.
* Surface Water location was Dry during March 2022 Sampling Event.

Data sources:
Base data NT Gov 2019
GW data AECOM 2021

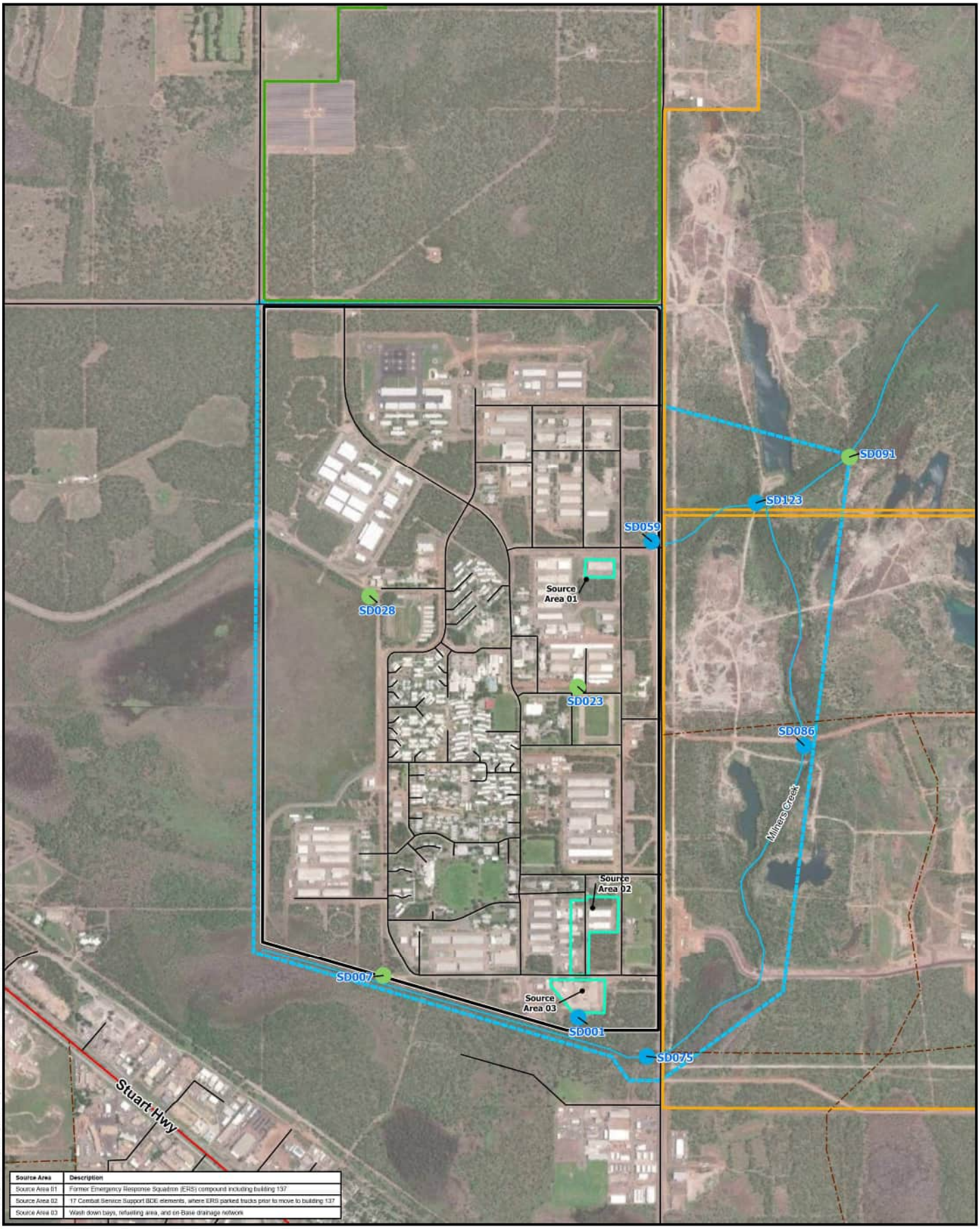
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Ongoing Monitoring Report (November 2021 – March 2023)
- Surface Water Analytical Results PFOS+PFHxS March 2023

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Figure
F5D

A3 size

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Source Area 02	17 Combat Service Support BDE elements, where ERS parked trucks prior to move to building 137
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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

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LEGEND

Sum of PFOS and PFHxS Concentrations

- <LOR
- LOR to <1.0 mg/kg

- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2021

Department of Defence
PFAS OMP ROBERTSON BARRACKS
Ongoing Monitoring Report (November 2021 – March 2023)
- Sediment Analytical Results PFOS+PFHxS April 2022

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Figure **F6**

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Appendix B

Tables

Appendix B Tables

Table T1
Historical Groundwater Gauging and Geochemical Parameters
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

Location ID	On / Off-Base	Sampled Date	Depth to Water (mbtoc)	Well Depth (mbtoc)	TOC (mAHD)	Water Elevation (mAHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr) (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method
MW001	On-Base	18/12/2019	-	-	-	-	Good	Insufficent water to sample											
MW001	On-Base	7/04/2020	-	-	-	-	Good	19.0	51.2	33.3	5.8	170.6	370.6	30.1	Clear	Clear	No odour	No sheen	Hydrasleeve
MW001	On-Base	4/11/2020	2.455	8.3	24.37	21.915	Good	0.25	46.7	30.4	4.74	397.6	597.6	29.1	Clear	Light Brown	Odourless	No sheen	Hydrasleeve
MW001	On-Base	15/04/2021	1.167	-	24.37	23.203	Good	0.89	46.5	30.2	5.58	141.6	341.6	30.6	Cloudy	Grey	Odourless	No Sheen	Hydrasleeve
MW001	On-Base	3/11/2021	2.862	8.2	24.37	21.508	Good	0.84	100.7	65.5	4.44	172.9	372.9	28.9	Medium	Orange / Brown	Odourless	No sheen	Hydrasleeve
MW001	On-Base	22/04/2022	1.171	8.15	24.37	23.199	Good	4.42	80.9	52.6	4.59	115.3	315.3	30.5	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW001	On-Base	20/09/2022	2.68	7.953	24.37	21.69	Good	1.51	47	30.6	4.89	136	336.0	29	Moderate,		Odourless	No sheen	Hydrasleeve
MW001	On-Base	22/03/2023	1.11	7.88	24.37	23.26	Good	1.03	70.1	45.6	5.53	37.5	237.5	29.2	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW004	On-Base	9/04/2019	2.594	3.226	26.78	24.186	-	0.26	58.5	38.0	5.02	3.8	203.8	32	Clear	Clear	No odour	No sheen	Hydrasleeve
MW004	On-Base	8/10/2019	-	3.217	26.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW004	On-Base	18/12/2019	-	-	26.78	-	Good	Insufficent water to sample											
MW005^	On-Base	18/12/2019	4.38	7.6	26.25	21.87	Good	0.53	34.8	22.6	5.01	305.8	505.8	31.5	Low	Clear	No odour	No Sheen	Hydrasleeve
MW004	On-Base	7/04/2020	3.14	8	26.78	23.64	Good	Insufficent water to sample											
MW005^	On-Base	7/04/2020	2.709	7.7	26.25	23.541	Good	0.8	29	18.9	5.16	219.6	419.6	30.5	Low	Clear	No odour	No Sheen	Hydrasleeve
MW004	On-Base	4/11/2020	4.778	8.37	26.78	22.002	Good	0.66	130.9	85.1	5.65	262.8	462.8	30.7	Turbid	Brown	Slight Organic	No Sheen	Hydrasleeve
MW004	On-Base	15/04/2021	2.874	3.03	26.78	23.906	Good	0.14	814	529.1	6.58	-155.4	44.6	32.3	Cloudy	Grey	Odourless	No Sheen	Hydrasleeve
MW004	On-Base	3/11/2021	5.5	8.35	26.78	21.28	Good	0.44	489.3	318.0	4.5	-52.3	147.7	31.3	Turbid	Orange / Brown	Organic Odour	No Sheen	Hydrasleeve
MW004	On-Base	22/04/2022	2.912	8.28	26.78	23.868	Good	1.37	92.5	60.1	4.75	115.2	315.2	32.9	Low	Slight yellow	Slight Hydrogen Sulphide Odour	No Sheen	Hydrasleeve
MW004	On-Base	19/09/2022	4.965	8.27	26.78	21.815	Impacted with roots	Root impaction - unable to sample											
MW004	On-Base	20/03/2023	2.844	4.1	26.78	23.936	Impacted with roots	0.62	45.8	29.8	4.71	121.2	321.2	29.8	High	Pale brown	Odourless	No sheen	Hydrasleeve
MW004D	On-Base	18/12/2019	4.791	32	26.78	21.989	Good	0.82	370.1	240.6	6.55	177.9	377.9	32.4	Low	Clear	No odour	No Sheen	Hydrasleeve
MW004D	On-Base	7/04/2020	3.091	30.8	26.78	23.689	Good	0.47	6.63	4.3	6.64	26.4	226.4	31.4	Clear	Brown	No odour	No Sheen	Hydrasleeve
MW004D	On-Base	4/11/2020	5.7	-	26.78	21.08	Good	1.22	391.5	254.5	6.52	268.3	468.3	31.7	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW004D	On-Base	15/04/2021	2.808	31.28	26.78	23.972	Good	0.71	367.5	238.9	6.71	-60.1	139.9	31.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW004D	On-Base	3/11/2021	5.5	31.8	26.78	21.28	Good	0.87	371.6	241.5	5.1	-56.8	143.2	31.1	Medium	Orange / Brown	Hydrogen Sulphide odour	No Sheen	Hydrasleeve
MW004D	On-Base	22/04/2022	2.848	31.3	26.78	23.932	Good	3.92	354.2	230.2	6.51	-0.9	199.1	31.5	Low	Grey	Hydrogen Sulphide odour	No Sheen	Hydrasleeve
MW004D	On-Base	20/09/2022	4.955	31.233	26.78	21.825	Good	1.69	341.4	221.9	6.71	-42.3	157.7	30.7	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW004D	On-Base	20/03/2023	2.795	31.1	26.78	23.985	Good	1.17	359	233.4	6.68	-11	189.0	30.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012	On-Base	18/12/2019	5.115	10.08	30.65	25.535	-	0.36	38.6	25.1	4.99	189	389.0	32.6	Low	Clear	Odourless	No Sheen	Hydrasleeve
MW012	On-Base	7/04/2020	3.861	10.08	30.65	26.789	Good	0.75	54.6	35.5	5.52	93.4	293.4	32.3	Clear	Clear	Odourless	No Sheen	Hydrasleeve
MW012	On-Base	4/11/2020	5.919	8.745	30.65	24.731	Good	0.81	43.5	28.3	5.17	375.2	575.2	32	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW012	On-Base	15/04/2021	3.413	10.08	30.65	27.237	Good	0.85	56.8	36.9	5.53	98.5	298.5	32.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW012	On-Base	2/11/2021	6.161	10.67	30.65	24.489	Good	1.75	36.9	24.0	4.73	213.2	413.2	30.3	Low	Orange / Brown	Odourless	No Sheen	Hydrasleeve
MW012	On-Base	22/04/2022	3.372	-	30.65	27.278	Good	3.16	73.4	47.7	4.96	102.7	302.7	32	Low	Colourless,	Odourless	No sheen	Hydrasleeve
MW012	On-Base	20/09/2022	8.42	10.7	30.65	22.23	Good	1.56	32.3	21.0	4.74	247.6	447.6	31.9	Low	Colourless	Odourless	No Sheen	Hydrasleeve
MW012	On-Base	22/03/2023	3.16	23.55	30.65	27.49	Good	0.78	59.7	38.8	5.29	73.1	273.1	32.2	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012D	On-Base	18/12/2019	8.048	30.19	30.77	22.722	Good	0.64	52.6	34.2	5.26	200.3	400.3	33.5	Low	Light Brown	No odour	No Sheen	Hydrasleeve
MW012D	On-Base	7/04/2020	2.014	30.13	30.77	28.756	Good	1.03	38.8	25.2	5.47	58.1	258.1	31.4	Clear	Clear	No odour	No Sheen	Hydrasleeve
MW012D	On-Base	4/11/2020	7.942	-	30.77	22.828	Good	2.05	54.9	35.7	6.07	324	524.0	31.5	Clear	Colourless	Hydrogen Sulphide odour	No Sheen	Hydrasleeve
MW012D	On-Base	15/04/2021	5.178	32	30.77	25.592	Good	0.62	47.1	30.6	6.17	91.6	291.6	31.4	Clear	Colourless	Hydrogen Sulphide odour	No Sheen	Hydrasleeve
MW012D	On-Base	2/11/2021	8.438	30.7	30.77	22.332	Good	0.81	39.5	25.7	4.51	129.1	329.1	30.2	Low	Yellow / Brown	Hydrogen Sulphide odour	No Sheen	Hydrasleeve
MW012D	On-Base	22/04/2022	5.083	30.75	30.77	25.687	Good	5.05	82.7	53.8	5.98	99.8	299.8	31.7	Low	Light brown	Odourless	No Sheen	Hydrasleeve
MW012D	On-Base	19/09/2022	7.715	-	30.77	23.055	Good	1.69	38.8	25.2	5.1	140.0	340.0	31.1	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012D	On-Base	22/03/2023	4.78	-	30.77	25.99	Good	2.25	55.2	35.9	5.18	72.8	272.8	31.8	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW018	Off-Base	18/12/2019	4.14	8.72	25.57	21.43	Good	0.79	35.1	22.8	4.88	266.5	466.5	31.7	Low	Clear	Odourless	No Sheen	Hydrasleeve
MW018	Off-Base	6/04/2020	2.785	8.04	25.57	22.785	Good	1.8	64.6	42.0	5.24	244.3	444.3	29.9	Clear	Clear	Odourless	No Sheen	Hydrasleeve
MW018	Off-Base	4/11/2020	4.001	6.932	25.57	21.569	Good	1.03	39.3	25.5	5.06	382.3	582.3	30.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW018	Off-Base	15/04/2021	2.536	8.715	25.57	23.034	Good	1.3	43.2	28.1	5.53	155.5	355.5	30.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW018	Off-Base	2/11/2021	4.588	8.72	25.57	20.982	Good	0.7	41.4	26.9	4.01	218.2	418.2	30	Low	Orange / Brown	Odourless	No Sheen	Hydrasleeve
MW018	Off-Base	22/04/2022	2.615	8.71	25.57	22.955	Good	8.34	301.3	195.8	5.69	74.2	274.2	31.1	Low	Light brown	Odourless	No Sheen	Hydrasleeve
MW018	Off-Base	20/09/2022	4.525	8.683	25.57	21.045	Good	2.32	39.9	25.9	5.03	141.1	341.1	30	Moderate		Odourless	No sheen	Hydrasleeve
MW018	Off-Base	22/03/2023	2.49	8.73	25.57	23.08	Good	1.99	65.7	42.7	5.53	67.7	267.7	30.3	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW021	Off-Base	18/12/2019	2.6	8.71	18.03	15.43	Good	0.48	41.7	27.1	4.71	256.4	456.4	32.5	Low	Clear	Odourless	No Sheen	Hydrasleeve
MW021	Off-Base	6/04/2020	2.218	7.99	18.03	15.812	Good	0.77	76.1	49.5	5.65	88	288.0	30.6	Clear	Clear	Hydrogen Sulfide odour	No Sheen	Hydrasleeve
MW021	Off-Base	4/11/2020	2.532	7.115	18.03	15.498	Good	2.33	81.1	52.7	7.81	384.4	584.4	30.3	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021	Off-Base	15/04/2021	2.948	8.47	18.03	15.082	Good	0.86	63.6	41.3	5.19	175.2	375.2	30.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021	Off-Base	2/11/2021	3.409	8.72	18.03	14.621	Good	2.28	43.7	28.4	4.24	199.2	399.2	30.4	Medium	Orange / Brown	Organic odour	No Sheen	Hydrasleeve
MW021	Off-Base	22/04/2022	2.226	8.72	18.03	15.804	Good	5.75	112.6	73.2	5.09	100.2	300.2	29.7	Low	Light brown	Odourless	No Sheen	Hydrasleeve
MW021	Off-Base	20/09/2022	2.822	8.705	18.03	15.208	Good	3.16	68	44.2	4.89	129.6	329.6	29.2	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW021	Off-Base	22/03/2023	2.002		18.03	16.028	Good	2.28	100.2	65.1	5.95	68.3	268.3	28.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW021D	Off-Base	18/12/2019	2.71	30.74	17.99	15.28	Good	0.54	148.3	96.4	5.91	217.2	417.2	32.3	Low	Light Brown	Odourless	No Sheen	Hydrasleeve
MW021D	Off-Base	6/04/2020	5.705	30.19	17.99	12.285	Good	1.17	139.6	90.7	6.11	169.4	369.4	30.2	Clear	Grey	Odourless	No Sheen	Hydrasleeve
MW021D	Off-Base	4/11/2020	2.741		17.99	15.249	Good	0.83	157.9	102.6	6.46	380.2	580.2	30.1	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021D	Off-Base	15/04/2021	2.219	31.18	17.99	15.771	Good	1.08	144.3	93.8	5.95	135.1	335.1	29.8	Turbid	Red	Odourless	No Sheen	Hydrasleeve
MW021D	Off-Base	2/11/2021	3.299	31.1	17.99	14.691	Good	0.86	142.8	92.8	4.57	131.2	331.2	30.3	Medium	Orange / Brown	Organic odour	No Sheen	Hydrasleeve
MW021D	Off-Base	22/04/2022	1.95	30.9	17.99	16.04	Good	3.04	179.6	116.7	5.94	60.9	260.9	30	Low	Light brown	Odourless	No Sheen	Hydrasleeve
MW021D	Off-Base	20/09/2022	3.242	30.942	17.99	14.748	Good	2.19	150.1	97.6	5.54	188.8	388.8	29.5	Moderate		Odourless	No sheen	Hydrasleeve
MW021D	Off-Base	22/03/2023	1.905	30.62	17.99	16.085	Good	2.32	151.2	98.3	6.07	70.8	270.8	28.4	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW023	Off-Base	7/04/2020	-	5.025	12.16	-	Good	Dry											
MW023	Off-Base	4/11/2020	-	-	12.16	-	Good	Dry											
MW023	Off-Base	15/04/2021	5.655	6.75	12.16	6.505	Good	1.26	166.8	108.4	6.06	114.7	314.7	30.4	Clear	Light brown	Odourless	No Sheen	Hydrasleeve
MW023	Off-Base	3/11/2021	-	-	12.16	-	Good	Dry, MW024 sampled as alternate well.											
MW024*	Off-Base	3/11/2021	3.425	8.93	6.34	2.915	Good	1.54	1902	1236.3	4.51	148.7	348.7	32.1	Turbid	Yellow/Brown	Odourless	No Sheen	Hydrasleeve
MW023	Off-Base	21/04/2022	-	-	12.16	-	Well head damaged	Unable to sample, MW024 sampled as alternate well.											
MW024*	Off-Base	22/04/2022	1.488	8.95	6.34	4.852	Good	3.54	693	450.5	5.84	75.2	275.2	30.3	Low	Light brown	Odourless	No Sheen	Hydrasleeve
MW023	Off-Base	20/09/2022	6.712	6.835	12.16	5.448	Good	Dry, MW024 sampled as alternate well.											
MW024*	Off-Base	21/09/2022	2.458	8.92	6.34	3.882	Good	2.21	148.27	96.4	6.09	-37.6	162.4	30.8	Moderate	Orange/brown	Odourless	No Sheen	Hydrasleeve
MW023	Off-Base	22/03/2023	5.865	6.86	-	-	New TOC	Insufficient water to collect parameters											

Table T1
Historical Groundwater Gauging and Geochemical Parameters
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

Location ID	On / Off-Base	Sampled Date	Depth to Water (mbtoc)	Well Depth (mbtoc)	TOC (mAHD)	Water Elevation (mAHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr) (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method
MW029	Off-Base	18/12/2019	2.92	7.42	25.436	22.516	Good	0.88	48.2	31.3	5.35	173.8	373.8	31.9	Medium	Light Brown	Odourless	No sheen	Hydrasleeve
MW029	Off-Base	6/04/2020	0.714	5.31	25.436	24.722	Good	9.5	59.6	38.7	5.7	107.2	307.2	31.2	Medium	Grey	-	No sheen	Hydrasleeve
MW029	Off-Base	4/11/2020	2.872	4.45	25.436	22.564	Good	0	73.4	47.7	5.75	273.7	473.7	31.9	Clear	Light Brown	Odourless	No sheen	Hydrasleeve
MW029	Off-Base	15/04/2021	1.676	7.8	25.436	23.76	Good	0.5	53	34.5	6.34	73.1	273.1	29.6	Turbid	Brown	Odourless	No sheen	Hydrasleeve
MW029	Off-Base	2/11/2021	2.997	7.82	25.436	22.439	Good	1.28	51.1	33.2	4.08	137.7	337.7	31.4	Turbid	Orange / Brown	Slight Organic odour	No sheen	Hydrasleeve
MW029	Off-Base	22/04/2022	1.714	7.76	25.436	23.722	Good	4.16	301.4	195.9	5.82	-1.4	198.6	30.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW029	Off-Base	20/09/2022	3.27	7.692	25.436	22.166	Good	1.28	33.7	21.9	5.53	94.8	294.8	31.6	High	Light brown	Hydrogen Sulfide odour	No sheen	Hydrasleeve
MW029	Off-Base	22/03/2023	0.59	7.54	25.436	24.846	Good	0.88	68.4	44.5	5.45	58	258.0	30.8	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW030	Off-Base	18/12/2019	2.16	7.27	23.33	21.17	Good	1.16	39	25.4	4.99	263.6	463.6	29.3	Low	Light Brown	Odourless	No sheen	Hydrasleeve
MW030	Off-Base	6/04/2020	0.876	8.17	23.33	22.454	Good	10.5	35.6	23.1	5.17	202.2	402.2	29.7	Clear	Clear	Odourless	No sheen	Hydrasleeve
MW030	Off-Base	4/11/2020	2.049	5.54	23.33	21.281	Good	0.42	71	46.2	5.68	280.1	480.1	28.9	Turbid	Brown	Slight Organic odour	No sheen	Hydrasleeve
MW030	Off-Base	15/04/2021	0.08	7.168	23.33	23.25	Good	0.6	40.3	26.2	6.73	182.7	382.7	29.8	Cloudy	Colourless	Odourless	No sheen	Hydrasleeve
MW030	Off-Base	2/11/2021	2.49	7.16	23.33	20.84	Good	1.85	44	28.6	3.81	168.2	368.2	29.8	Turbid	Yellow / Brown	Organic odour	No sheen	Hydrasleeve
MW030	Off-Base	22/04/2022	0.809	7.14	23.33	22.521	Good	6.66	463.6	301.3	6.45	5.4	205.4	28.9	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW030	Off-Base	20/09/2022	2.285	7.06	23.33	21.045	Good	2.19	37.8	24.6	5.12	146	346.0	29	High	Orange/brown	Odourless	No sheen	Hydrasleeve
MW030	Off-Base	22/03/2023	0.745	7.03	23.33	22.585	Good	1.97	56.6	36.8	5	75.7	275.7	29.3	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW031	Off-Base	18/12/2019	3.895	8.46	25.558	21.663	Good	0.65	42.4	27.6	4.82	247.2	447.2	31.6	Medium	Light Brown	Odourless	No sheen	Hydrasleeve
MW031	Off-Base	6/04/2020	2.404	7.96	25.558	23.154	Good	7.3	268	174.2	6.18	-6	194.0	31.4	Clear	Clear	-	No sheen	Hydrasleeve
MW031	Off-Base	4/11/2020	3.771	6.952	25.558	21.787	Good	0.69	73.1	47.5	5.55	308.6	508.6	31.3	Clear	Light Brown	Odourless	No sheen	Hydrasleeve
MW031	Off-Base	15/04/2021	2.206	8.22	25.558	23.352	Good	0.81	42.3	27.5	5.84	122.9	322.9	29.6	Turbid	Brown	Odourless	No sheen	Hydrasleeve
MW031	Off-Base	2/11/2021	4.199	8.15	25.558	21.359	Good	0.89	52.9	34.4	3.7	196.4	396.4	31.3	Turbid	Orange / Brown	Odourless	No sheen	Hydrasleve
MW031	Off-Base	22/04/2022	2.264	8.06	25.558	23.294	Good	5.34	85.2	55.4	4.59	112.4	312.4	31.3	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW031	Off-Base	20/09/2022	4.015	7.935	25.558	21.543	Good	2.25	56.9	37.0	5.25	137.9	337.9	31.2	High		Odourless	No sheen	Hydrasleeve
MW031	Off-Base	22/03/2023	2.2	7.67	25.558	23.358	Good	1.16	5.54	3.6	5.54	65.8	265.8	30.2	Low	Pale brown	Odourless	No sheen	Hydrasleeve
MW032	Off-Base	18/12/2019	5.677	8.81	19.862	14.185	Good	1	87.5	56.9	5.67	194.9	394.9	31.5	-	Clear	No odour	No sheen	Hydrasleeve
MW032	Off-Base	7/04/2020	2.301	8.14	19.862	17.561	Good	1.2	32.4	21.1	5.61	258.8	458.8	32.1	Clear	Clear	No odour	No sheen	Hydrasleeve
MW032	Off-Base	4/11/2020	5.258	6.95	19.862	14.604	Good	1.28	96.5	62.7	5.41	389.5	589.5	31.5	Clear	Colourless	Odourless	No sheen	Hydrasleeve
MW032	Off-Base	15/04/2021	2.216	8.715	19.862	17.646	Good	0.95	29.1	18.9	6.03	129.3	329.3	30.1	Clear	Colourless	Odourless	No sheen	Hydrasleeve
MW032	Off-Base	2/11/2021	5.68	8.72	19.862	14.182	Good	1.22	83.8	54.5	4.01	188.1	388.1	31.4	Medium	Orange / Brown	Odourless	No sheen	Hydrasleeve
MW032	Off-Base	22/04/2022	2.162	8.68	19.862	17.7	Good	7.04	78.2	50.8	5.1	102.4	302.4	30.9	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW032	Off-Base	20/09/2022	5.068	8.69	19.862	14.794	Good	3.02	104.8	68.1	5.43	108.4	308.4	30.2	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW032	Off-Base	22/03/2023	1.905	8.66	19.862	17.957	Good	1.32	48	31.2	5.16	65.9	265.9	30.8	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW034	On-Base	17/04/2019	2.643	11.302	19.5	16.857	Good	0.56	26.3	17.1	4.57	184.9	384.9	31.6	Clear	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	14/10/2019	7.145	11.35	19.5	12.355	Good, tubing in bottom	0.09	34.3	22.3	4.73	-51.1	148.9	32.9	Clear	Colourless	Hydrogen Sulfide odour	No sheen	Hydrasleeve
MW034	On-Base	14/10/2019	7.313	11.35	19.5	12.187	Good	-	-		-	-		-	-	-	-	-	-
MW034	On-Base	18/12/2019	5.115	11.471	19.5	14.385	Good	1.24	32.3	21.0	4.82	334.7	534.7	31.9	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	7/04/2020	2.739	12	19.5	16.761	Good	0.91	24.5	15.9	5	211.7	411.7	31.2	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	21/09/2020	5.976	11.4	19.5	13.524	Good	2.4	41.3	26.8	3.75	343.4	543.4	33.7	Low	Orange/Brown	Slight organic odour	No sheen	Hydrasleeve
MW034	On-Base	4/11/2020	6.799	8.829	19.5	12.701	Good	0.31	50.6	32.9	5.19	375.2	575.2	31.7	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	1/03/2021	2.33	11.4	19.5	17.17	Good	0.54	30.1	19.6	4.11	172.2	372.2	32.1	Low	Grey	Peutrified	No sheen	Hydrasleeve
MW034	On-Base	15/04/2021	2.552	11.47	19.5	16.948	Good	0.77	41.5	27.0	5.69	176.9	376.9	32.6	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	7/06/2021	4.13	11.4	19.5	15.37	Good	1.51	52.7	34.3	6.99	110	310.0	28.3	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	2/11/2021	5.209	11.4	19.5	14.291	Good	1.91	87.9	57.1	5.33	162.5	362.5	28.6	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW034	On-Base	22/04/2022	2.486	11.49	19.5	17.014	Good	2.1	82.5	53.6	4.57	128.4	328.4	31.2	Low	Colourless	Slight organic odour	No sheen	Hydrasleeve
MW034	On-Base	20/09/2022	5.932	11.51	19.5	13.568	Good	1.34	33.6	21.8	4.74	203.3	403.3	31.7	Low	Colourless	Strong hydrocarbon odour	No sheen	Hydrasleeve
MW034	On-Base	21/03/2023	2.23	11.8	19.5	17.27	Good	0.87	36.6	23.8	4.93	146.4	346.4	29.5	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW066	On-Base	18/12/2019	4.93		23.19	18.26	Good	0.24	49.6	32.2	4.43	331.6	531.6	33.1	Low	Light grey	Odourless	No sheen	Hydrasleeve
MW066	On-Base	7/04/2020	2.04	12	23.19	21.15	Damaged	No sample, well damaged											
MW066	On-Base	4/11/2020	4.69	9.82	23.19	18.5	Damaged Gatic Cover	1.99	53.4	34.7	4.48	455.8	655.8	32.3	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW066	On-Base	15/04/2021	2.977	11.95	23.19	20.213	Damaged Gatic Cover	1.51	51.4	33.4	5.1	218.3	418.3	30.5	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW066	On-Base	3/06/2021	4.27	12	23.19	18.92	Damaged Gatic Cover	2.63	37.7	24.5	4.33	283.5	483.5	32.3	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW066	On-Base	3/11/2021	5.925	11.93	23.19	17.265	Damaged Gatic Cover	2.06	52.5	34.1	4.81	197.5	397.5	32.1	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW066	On-Base	22/04/2022	2.912	11.94	23.19	20.278	Damaged Gatic Cover	2.15	79.9	51.9	4.2	154.2	354.2	32.9	Low	Grey	Odourless	No sheen	Hydrasleeve
MW066	On-Base	20/09/2022	5.635	11.93	23.19	17.555	Good	1.54	64.7	42.1	4.5	217.9	417.9	32.7	Low	Pale brown	Odourless	No sheen	Hydrasleeve
MW066	On-Base	21/03/2023	2.722	11.94	23.19	20.468	Good	0.76	39.7	25.8	4.38	205.7	405.7	31.3	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW080	On-Base	18/12/2019	4.398	13	26.6	22.202	Good	0.48	62.5	40.6	4.95	248.5	448.5	32.1	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW080	On-Base	7/04/2020	2.693	17	26.6	23.907	Good	0.93	63.7	41.4	5.29	187.3	387.3	31	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW080	On-Base	7/05/2020	2.94	12.99	26.6	23.66	Good	0.95	53.4	34.7	5.09		200.0	30.4	Low	Grey	Odourless	No sheen	Hydrasleeve
MW080	On-Base	4/11/2020			26.6	26.6	Good								Dry				
MW080	On-Base	15/04/2021	2.494	12.985	26.6	24.106	Good	0.67	355.2	230.9	6.3	-5.3	194.7	31.6	-	-	-	-	-
MW080	On-Base	3/06/2021	3.435	18.5	26.6	23.165	Good	1.39	29.1	18.9	4.85	201.4	401.4	31.3	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW080	On-Base	3/11/2021	4.636	12.99	26.6	21.964	Good	1.28	59	38.4	4.03	196.3	396.3	32	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW080	On-Base	22/04/2022	2.511	13	26.6	24.089	Good	0.78	98.5	64.0	4.21	133.2	333.2	32.7	Cloudy	Colourless	Odourless	No sheen	Hydrasleeve
MW080	On-Base	20/09/2022	4.648	11.977	26.6	21.952	Good	1.82	65.5	42.6	4.38	245.2	445.2	30.6	Low	Yellow brown	Odourless	No sheen	Hydrasleeve
MW080	On-Base	21/03/2023	2.431	12.99	26.6	24.169	Good	0.55	48.7	31.7	4.73	117.3	317.3	29.6	Moderate	Light brown	Odourless	No sheen	Hydrasleeve

Table T1
Historical Groundwater Gauging and Geochemical Parameters
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

Location ID	On / Off-Base	Sampled Date	Depth to Water (mbtoc)	Well Depth (mbtoc)	TOC (mAHD)	Water Elevation (mAHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr) (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method
MW112	Off-Base	18/12/2019	Did not measure due to tapped well					2.06	404.6	263.0	6.87	-45.6	154.4	33.2	Low	Colourless	Odourless	No sheen	Tap
MW112	Off-Base	7/04/2020	Did not measure due to tapped well					Did not sample due to electrical pump failure											
MW112	Off-Base	4/11/2020	Did not measure due to tapped well					4.46	385.6	250.6	6.2	23.2	223.2	28.4	Low	Colourless	Odourless	No sheen	Tap
MW112	Off-Base	16/04/2021	Did not measure due to tapped well					2.13	375.7	244.2	6.88	-50.1	149.9	31.6	Low	Colourless	Odourless	No sheen	Tap
MW112	Off-Base	02/11/2021	Did not measure due to tapped well					1.11	279.4	181.6	5.9	32.9	239.3	24.9	Medium	Orange / Brown	No odour	No sheen	Tap
MW112	Off-Base	21/04/2022 0:00	Did not measure due to tapped well					2.98	339.4	220.6	6.75	-74.2	239.3	29.3	Low	Orange	Odourless	No sheen	Tap
MW112	Off-Base	21/09/2022	Did not measure due to tapped well					3.02	799	519.4	7.32	-37.5	162.5	32.9	Low	Light brown	Odourless	No sheen	Tap
MW112	Off-Base	22/03/2023	Did not measure due to tapped well					No parameters collected											Tap
MW113	Off-Base	18/12/2019	Did not measure due to tapped well					1.58	332.4	216.1	6.53	-63.7	136.3	32.4	Low	Colourless	Odourless	No sheen	Tap
MW113	Off-Base	7/04/2020	Did not measure due to tapped well					36.4	305.6	198.6	6.63	-2	198.0	33	Low	Colourless	Odourless	No sheen	Tap
MW113	Off-Base	4/11/2020	Did not measure due to tapped well					3.06	342.3	222.5	6.47	-22.6	177.4	30.6	Low	Colourless	Odourless	No sheen	Tap
MW113	Off-Base	16/04/2021	Did not measure due to tapped well					1.32	324.1	210.7	6.79	-78.9	121.1	31.7	Low	Colourless	Odourless	No sheen	Tap
MW113	Off-Base	02/11/2021	Did not measure due to tapped well					1.34	361.8	235.2	5.9	98.8	298.8	24.8	Low	Grey	No odour	No sheen	Tap
MW113	Off-Base	21/04/2022 0:00	Did not measure due to tapped well					3.04	364.4	236.9	6.82	63.2	263.2	31.3	Low	Colourless	Odourless	No sheen	Tap
MW113	Off-Base	21/09/2022	Did not measure due to tapped well					2.71	384.7	250.1	6.77	-52.8	147.2	33	Low	Light brown	Odourless	No sheen	Tap
MW113	Off-Base	22/03/2023	Did not measure due to tapped well					No parameters collected											Tap

Notes:
MW024 - contingency well for dry MW023
mbtoc: meters below top of casing
mAHD: meters Australian Height Datum
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius
Redox Corrected = redox potential relative to the standard hydrogen electrode (Eh = Er + 200mV)
* = Results taken from MW024 as an alternate well to MW023
^ = Results taken from MW005 as an alternate well to MW004

Table T2 Historical Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

													PFAS (Full Suite)																						
													10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	FOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	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													0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																																										
PFAS NEMP (2020) FW 99% Species Protection																																						19	0.0002			
Human Health Receptors																																										
PFAS NEMP (2020) Human Health Drinking Water																																						0.56			0.07	
Location Code	**On / Off-Base**	**Date**	**Field ID**	**Sample Type**																																						
MW001	On-Base	30 Oct 2017	MW001	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.13	0.07	0.2	0.2
MW001	On-Base	06 Feb 2018	MW001	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.04	0.15	0.15
MW001	On-Base	28 Nov 2018	MW001	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.15	0.07	0.22	0.22
MW001	On-Base	01 May 2019	MW001	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.09	0.04	0.13	0.13
MW001	On-Base	01 May 2019	QC111	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.1	0.04	0.14	0.14
MW001	On-Base	01 May 2019	QC211	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.09	0.04	0.13	0.14
MW001	On-Base	07 Apr 2020	1200_MW001_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.28	0.07	0.35	0.37
MW001	On-Base	05 Nov 2020	1200_MW001_201105	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.17	0.06	0.23	0.23
MW001	On-Base	05 Nov 2020	1200_QC102_201105	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.15	0.06	0.21	0.21
MW001	On-Base	05 Nov 2020	1200_QC202_201105	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	0.14	0.054	-	-
MW001	On-Base	15 Apr 2021	1200_MW001_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.04	0.12	0.12
MW001	On-Base	03 Nov 2021	1200_MW001_211103	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.14	0.05	0.19	0.19
MW001	On-Base	03 Nov 2021	1200_QC101_211103	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.12	0.04	0.16	0.16
MW001	On-Base	20 Apr 2022	1200_MW001_220420	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.04	0.12	0.12
MW001	On-Base	20 Sep 2022	1200_MW001_220920	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.06	0.17	0.17
MW001	On-Base	22 Mar 2023	1200_MW001_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.04	0.15	0.15
MW004	On-Base	30 Oct 2017	MW004	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.07	0.06	0.13	0.17
MW004	On-Base	08 Feb 2018	MW004	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.08	0.19	0.24
MW004	On-Base	28 Nov 2018	MW004	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.06	0.17	0.2
MW004	On-Base	28 Nov 2018	QC102	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.1	0.05	0.15	0.17
MW004	On-Base	28 Nov 2018	QC202	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	0.05	0.16	0.2
MW004	On-Base	01 May 2019	MW004	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	0.03	0.07	0.07
MW004	On-Base	01 May 2019	QC110	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	0.02	0.06	0.06
MW004	On-Base	01 May 2019	QC210	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.02	0.07	<0.1
MW004	On-Base	05 Nov 2020	1200_MW004_201105	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	<0.02	0.08	0.08
MW004	On-Base	15 Apr 2021	1200_MW004_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.15	0.03	0.18	0.25
MW004	On-Base	15 Apr 2021	1200_QC101_210415	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.07	<0.02	<0.05	<0.02	<0.02	<0.01	0.24	0.04	0.28	0.4
MW004	On-Base	15 Apr 2021	1200_QC201_210415	Interlab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.10	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.17	0.03	0.2	0.27
MW004	On-Base	03 Nov 2021	1200_MW004_211103	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.14	<0.02	<0.02	0.16	<0.02	<0.05	<0.02	<0.02	<0.01	0.32	0.12	0.44	0.74
MW004	On-Base	21 Apr 2022	1200_MW004_220422	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.07	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.01	0.04	0.04
MW004	On-Base	21 Apr 2022	1200_QC104_220422	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	0.01	0.05	0.05
MW004	On-Base	22 Apr 2022	1200_QC204_220422	Interlab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.10	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.01	0.04	0.04
MW004	On-Base	21 Mar 2023	1200_MW004_230321	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.09	0.06	0.15	0.15
MW004D	On-Base	02 Nov 2017	MW004D	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	10 Feb 2018	MW004D	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	28 Nov 2018	MW004D	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	01 May 2019	MW004D	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	18 Dec 2019	1200_MW004D_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	07 Apr 2020	1200_MW004_D_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	04 Nov 2020	1200_MW004_D_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	15 Apr 2021	1200_MW004D_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW004D	On-Base	03 Nov 2021	1200_MW004D_211103	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW004D	On-Base	20 Apr 2022	1200_MW004D_220420	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW004D	On-Base	20 Sep 2022	1200_MW004D_220920	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW004D	On-Base	20 Sep 2022	1200_QC100_220920	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW004D	On-Base	20 Sep 2022	1200_QC200_220920	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.05	<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	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	-	-
MW004D	On-Base	22 Mar 2023	1200_MW004D_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW005*	On-Base	19 Dec 2019	1200_MW005_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW005*	On-Base	07 Apr 2020	1200_MW005_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01

Table T2 Historical Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

						PFAS (Full Suite)																												
						10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	FOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	µg/L	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						0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																																		
PFAS NEMP (2020) FW 99% Species Protection																															19	0.0002			
Human Health Receptors																																		
PFAS NEMP (2020) Human Health Drinking Water																															0.56			0.07	
Location Code	**On / Off-Base**	**Date**	**Field ID**	**Sample Type**																														
MW012	On-Base	01 Nov 2017	MW012	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012	On-Base	09 Feb 2018	MW012	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012	On-Base	28 Nov 2018	MW012	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	01 May 2019	MW012	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	18 Dec 2019	1200_MW012_181219	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	06 Apr 2020	1200_MW012_200407	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	07 Apr 2020	1200_MW012_D_200407	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	04 Nov 2020	1200_MW012_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	04 Nov 2020	1200_MW012_D_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	15 Apr 2021	1200_MW012_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012	On-Base	02 Nov 2021	1200_MW012_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012	On-Base	20 Apr 2022	1200_MW012_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012	On-Base	20 Sep 2022	1200_MW012_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012	On-Base	20 Sep 2022	1200_QC201_220920	Interlab Dup		<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	<0.05	<0.01	-	-	
MW012	On-Base	22 Mar 2023	1200_MW012_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012D	On-Base	02 Nov 2017	MW012D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012D	On-Base	10 Feb 2018	MW012D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012D	On-Base	28 Nov 2018	MW012D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012D	On-Base	01 May 2019	MW012D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012D	On-Base	18 Dec 2019	1200_MW012D_181219	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012D	On-Base	15 Apr 2021	1200_MW012D_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW012D	On-Base	02 Nov 2021	1200_MW012D_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012D	On-Base	20 Apr 2022	1200_MW012D_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012D	On-Base	20 Sep 2022	1200_MW012D_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW012D	On-Base	22 Mar 2023	1200_MW012D_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW018	Off-Base	01 Nov 2017	MW018	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	10 Feb 2018	MW018	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	27 Nov 2018	MW018	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	01 May 2019	MW018	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	18 Dec 2019	1200_MW018_191219	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	07 Apr 2020	1200_MW018_200407	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	04 Nov 2020	1200_MW018_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	15 Apr 2021	1200_MW018_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	15 Apr 2021	1200_QC100_210415	Intralab Dup		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	15 Apr 2021	1200_QC200_210415	Interlab Dup		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW018	Off-Base	02 Nov 2021	1200_MW018_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW018	Off-Base	20 Apr 2022	1200_MW018_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW018	Off-Base	20 Sep 2022	1200_MW018_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW018	Off-Base	22 Mar 2023	1200_MW018_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW021	Off-Base	02 Nov 2017	MW021	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	09 Feb 2018	MW021	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	28 Nov 2018	MW021	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	01 May 2019	MW021	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	18 Dec 2019	1200_MW0021_191218	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.03	<0.01	<0.01
MW021	Off-Base	06 Apr 2020	1200_MW021_200406	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	06 Apr 2020	1200_MW021_D_200406	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	04 Nov 2020	1200_MW021_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	15 Apr 2021	1200_MW021_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021	Off-Base	02 Nov 2021	1200_MW021_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW021	Off-Base	20 Apr 2022	1200_MW021_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW021	Off-Base	20 Sep 2022	1200_MW021_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW021	Off-Base	22 Mar 2023	1200_MW021_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01

Table T2 Historical Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

						PFAS (Full Suite)																													
						10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	FOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	µg/L	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						0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																																			
PFAS NEMP (2020) FW 99% Species Protection																														19	0.0002				
Human Health Receptors																																			
PFAS NEMP (2020) Human Health Drinking Water																														0.56			0.07		
Location Code	**On / Off-Base**	**Date**	**Field ID**	**Sample Type**																															
MW021D	Off-Base	01 Nov 2017	MW021D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01
MW021D	Off-Base	10 Feb 2018	MW021D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
MW021D	Off-Base	23 May 2018	MW21D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	28 Nov 2018	MW021D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	01 May 2019	MW021D	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	18 Dec 2019	1200_MW0021D_191218	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	04 Nov 2020	1200_MW021_D_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	15 Apr 2021	1200_MW021D_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	02 Nov 2021	1200_MW021D_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW021D	Off-Base	20 Apr 2022	1200_MW021D_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW021D	Off-Base	20 Sep 2022	1200_MW021D_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW021D	Off-Base	22 Mar 2023	1200_MW021D_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW023	Off-Base	02 Nov 2017	MW023	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW023	Off-Base	10 Feb 2018	MW023	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW023	Off-Base	01 May 2019	MW023	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW023	Off-Base	15 Apr 2021	1200_MW023_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW023	Off-Base	22 Mar 2023	1200_MW023_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW024	Off-Base	02 Nov 2017	MW024	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW024	Off-Base	07 Feb 2018	MW024	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW024*	Off-Base	03 Nov 2021	1200_MW024_211103	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW024*	Off-Base	21 Sep 2022	1200_MW024_220921	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW024*[1]	Off-Base	20 Apr 2022	1200_MW024_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW024*[1]	Off-Base	20 Apr 2022	1200_QC100_220420	Intralab Dup		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW024*[1]	Off-Base	20 Apr 2022	1200_QC200_220420	Interlab Dup		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.01	0.01	0.01
MW024*[1]	Off-Base	30 May 2022	1200_MW024_220530	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW029	Off-Base	10 Feb 2018	MW029	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	27 Nov 2018	MW029	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	02 May 2019	MW029	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	18 Dec 2019	1200_MW029_191218	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	06 Apr 2020	1200_MW029_200406	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	04 Nov 2020	1200_MW029_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	16 Apr 2021	1200_MW029_210416	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW029	Off-Base	02 Nov 2021	1200_MW029_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW029	Off-Base	20 Apr 2022	1200_MW029_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW029	Off-Base	20 Sep 2022	1200_MW029_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	0.02
MW029	Off-Base	22 Mar 2023	1200_MW029_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW029	Off-Base	22 Mar 2023	1200_QC100_230322	Intralab Dup		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW030	Off-Base	12 Feb 2018	MW030	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.03	0.14	0.16
MW030	Off-Base	27 Nov 2018	MW030	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.16	0.07	0.23	0.25
MW030	Off-Base	02 May 2019	MW030	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.01	0.12	0.06	0.18	0.22
MW030	Off-Base	18 Dec 2019	1200_MW030_191218	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.1	0.05	0.15	0.15
MW030	Off-Base	06 Apr 2020	1200_MW030_200406	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.04	0.12	0.14
MW030	Off-Base	04 Nov 2020	1200_MW030_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.14	0.05	0.19	0.19
MW030	Off-Base	15 Apr 2021	1200_MW030_210415	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.09	0.04	0.13	0.15
MW030	Off-Base	02 Nov 2021	1200_MW030_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.01	0.32	0.08	0.4	0.41
MW030	Off-Base	20 Apr 2022	1200_MW030_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.1	0.04	0.14	0.14
MW030	Off-Base	20 Sep 2022	1200_MW030_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.11	0.05	0.16	0.16
MW030	Off-Base	22 Mar 2023	1200_MW030_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.03	0.11	0.11
MW031	Off-Base	10 Feb 2018	MW031	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW031	Off-Base	27 Nov 2018	MW031	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
MW031	Off-Base	02 May 2019	MW031	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW031	Off-Base	18 Dec 2019	1200_MW031_191218	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW031	Off-Base	06 Apr 2020	1200_MW031_200406	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	<0.02	<0.02	0.02	0.02
MW031	Off-Base	04 Nov 2020	1200_MW031_201104	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.01	<0.02	<0.02	0.01	0.01
MW031	Off-Base	16 Apr 2021	1200_MW031_210416	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW031	Off-Base	02 Nov 2021	1200_MW031_211102	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW031	Off-Base	20 Apr 2022	1200_MW031_220420	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW031	Off-Base	20 Sep 2022	1200_MW031_220920	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW031	Off-Base	22 Mar 2023	1200_MW031_230322	Primary		<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	<0.01	0.03	0.03

Table T2 Historical Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

					PFAS (Full Suite)																												
					10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	FOSA	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	FOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	µg/L	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					0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																																	
PFAS NEMP (2020) FW 99% Species Protection																														19	0.0002			
Human Health Receptors																																	
PFAS NEMP (2020) Human Health Drinking Water																														0.56			0.07	
Location Code	**On / Off-Base**	**Date**	**Field ID**	**Sample Type**																														
MW032	Off-Base	10 Feb 2018	MW032	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01
MW032	Off-Base	27 Nov 2018	MW032	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.04	0.09	0.21
MW032	Off-Base	01 May 2019	MW032	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	0.05	0.02	0.07	0.07
MW032	Off-Base	18 Dec 2019	1200_MW032_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.02	0.01	<0.02	0.01	0.01
MW032	Off-Base	07 Apr 2020	1200_MW032_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.14
MW032	Off-Base	04 Nov 2020	1200_MW032_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	0.04	<0.02	0.04	0.04
MW032	Off-Base	04 Nov 2020	1200_QC101_201104	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	0.03	<0.02	0.03	0.03
MW032	Off-Base	04 Nov 2020	1200_QC201_201104	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	0.1	0.028		-
MW032	Off-Base	16 Apr 2021	1200_MW032_210416	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.19
MW032	Off-Base	02 Nov 2021	1200_MW032_211102	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.1
MW032	Off-Base	02 Nov 2021	1200_QC100_211102	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.12
MW032	Off-Base	20 Apr 2022	1200_MW032_220420	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.08	<0.02	<0.05	<0.02	<0.02	<0.01	0.06	0.03	0.09	0.24
MW032	Off-Base	20 Sep 2022	1200_MW032_220920	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.14
MW032	Off-Base	22 Mar 2023	1200_MW032_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.07	0.02	0.09	0.11
MW032	Off-Base	22 Mar 2023	1200_QC101_230322	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.02	0.07	0.09
MW034	On-Base	01 Jun 2016	ROBMW01	Primary	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	0.06	-		-
MW034	On-Base	18 Jul 2017	ROBMW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	<0.02	0.05	0.09
MW034	On-Base	02 Nov 2017	ROBMW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.02	0.05	0.05
MW034	On-Base	10 Feb 2018	QC134	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
MW034	On-Base	10 Feb 2018	QC234	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<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	<0.01	<0.01	<0.01	0.03	0.01	0.04	<0.1
MW034	On-Base	10 Feb 2018	ROBMW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	0.03	<0.02	0.03	0.03
MW034	On-Base	23 May 2018	ROBMW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.05	<0.02	<0.02	<0.02	0.05	<0.02	<0.05	<0.02	<0.02	<0.01	0.07	0.03	0.1	0.22
MW034	On-Base	28 Nov 2018	ROBMW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	0.02	<0.02	0.02	0.02
MW034	On-Base	01 May 2019	ROBMW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.02	0.07	0.15
MW034	On-Base	18 Dec 2019	1200_ROBMW01_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.06	<0.02	<0.02	0.05	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	0.03	0.09	0.23
MW034	On-Base	07 Apr 2020	1200_MW034_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.02	0.07	0.15
MW034	On-Base	07 Apr 2020	1200_QC102_200407	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.02	0.07	0.15
MW034	On-Base	07 Apr 2020	1200_QC202_200407	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	0.031	<0.01	<0.01	0.035	<0.01	<0.02	<0.02	<0.01	<0.01	<0.01	0.048	0.02	-	-
MW034	On-Base	04 Nov 2020	1200_MW034_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	0.2	<0.02	<0.02	0.12	<0.02	<0.05	<0.02	<0.02	0.03	0.15	0.06	0.21	0.65
MW034	On-Base	15 Apr 2021	1200_MW034_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	0.03	0.07	0.14
MW034	On-Base	02 Nov 2021	1200_MW034_211102	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.07	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	0.01	0.09	0.03	0.12	0.29
MW034	On-Base	21 Apr 2022	1200_MW034_220422	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.05	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.21
MW034	On-Base	22 Apr 2022	1200_QC101_220422	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.05	<0.02	<0.02	0.05	<0.02	<0.05	<0.02	<0.02	<0.01	0.06	0.03	0.09	0.21
MW034	On-Base	22 Apr 2022	1200_QC201_220422	Interlab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.06	<0.02	<0.05	<0.02	<0.02	<0.01	0.07	0.02	0.09	0.2
MW034	On-Base	20 Sep 2022	1200_MW034_220920	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.03	0.11	0.19
MW034	On-Base	21 Mar 2023	1200_MW034_230321	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.04	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.02	0.1	0.19
MW066	On-Base	20 Mar 2014	103MW02	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	0.4	-	-	-
MW066	On-Base	01 Jun 2016	103MW02	Primary	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	0.42	-		-
MW066	On-Base	18 Jul 2017	103MW02	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	0.02	0.48	0.14	0.62	0.72
MW066	On-Base	18 Jul 2017	QC01	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	0.02	0.51	0.12	0.63	0.73
MW066	On-Base	20 Jul 2017	103MW02_H	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	0.02	0.51	0.13	0.64	0.72
MW066	On-Base	01 Nov 2017	103MW02	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.61	0.17	0.78	0.85
MW066	On-Base	01 Nov 2017	QC114	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03	<0.01	<0.01	<0.01	0.01	0.01	0.04	<0.01	<0.05	0.02	0.02	<0.01	<0.01	<0.01	<0.01	0.03	0.63	0.13	0.76	0.92
MW066	On-Base	01 Nov 2017	QC114	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.7	0.19	0.89	0.96
MW066	On-Base	12 Feb 2018	103MW02	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.08	<0.02	<0.02	<0.02	0.04	0.03	0.16	<0.02	<0.02	0.04	0.09	<0.05	<0.02	<0.02	0.08	1.04	0.4	1.44	1.96
MW066	On-Base	12 Feb 2018	QC135	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.08	<0.02	<0.02	<0.02	0.04	0.03	0.16	<0.02	<0.02	0.04	0.09	<0.05	<0.02	<0.02	0.07	1.12	0.36	1.48	1.99
MW066	On-Base	12 Feb 2018	QC235	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.01	<0.01	<0.01	0.04	0.03	0.16	<0.01	<0.05	0.04	0.08	<0.01	<0.01	<0.01	0.09	1.2	0.51	1.71	2.22
MW066	On-Base	28 Nov 2018	103MW02	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.41	0.14	0.55	0.61
MW066	On-Base	28 Nov 2018	QC103	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.41	0.1	0.51	0.56
MW066	On-Base	28 Nov 2018	QC203	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.05	0.01	0.02	<0.01	<0.01	<0.01	0.02	0.41	0.1	0.51	0.61
MW066	On-Base	03 May 2019	103MW02	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.34	0.09	0.43	0.47
MW066	On-Base	18 Dec 2019	1200_103MW02_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.25	0.08	0.33	0.36
MW066	On-Base	07 Apr 2020	1200_MW066_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.36	0.11	0.47	0.53
MW066	On-Base	04 Nov 2020	1200_MW066_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.34	0.09	0.43	0.48
MW066	On-Base	04 Nov 2020	1200_QC100_201104	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.3	0.1	0.4	0.45
MW066	On-Base	04 Nov 2020	1200_QC200_201104	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	0.028	<0.01	<0.01	<0.02	0.012	<0.02	<0.02	<0.01	0.015	0.35	0.068		-
MW066	On-Base	16 Apr 2021	1200_MW066_210416	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.39	0.12	0.51	0.57
MW066	On-Base	03 Nov 2021	1200_MW066_211103	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.42	0.12	0.54	0.6
MW066	On-Base	21 Apr 2022	1200_MW066_220422	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.34	0.08	0.42	0.47
MW066	On-Base	22 Apr 2022	1200_QC102_220422	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.01	0.29	0.08	0.37	0.4
MW066	On-Base	22 Apr 2022	1200_QC202_220422	Interlab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.28	0.08	0.36	0.4
MW066	On-Base	20 Sep 2022	1200_MW066_220920	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.39	0.14	0.53	0.58
MW066	On-Base	21 Mar 2023	1200_MW066_230321	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	0.03	<0.05	<0.02	<0.02	0.03	0.52	0.13	0.65	0.79

Table T2 Historical Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

					PFAS (Full Suite)																										
					10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	FOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	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					0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																																
PFAS NEMP (2020) FW 99% Species Protection																														19	0.0002			
Human Health Receptors																																		
PFAS NEMP (2020) Human Health Drinking Water																														0.56			0.07	
Location Code	**On / Off-Base**	**Date**	**Field ID**	**Sample Type**																														
MW080	On-Base	20 Mar 2014	RBQW3	Intralab Dup	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-
MW080	On-Base	20 Mar 2014	RBQW4	Interlab Dup	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	0.04	-	-	-
MW080	On-Base	01 Jun 2016	ROBMW07	Primary	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	-	-
MW080	On-Base	18 Jul 2017	ROBMW07	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW080	On-Base	30 Oct 2017	ROBMW07	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW080	On-Base	08 Feb 2018	ROBMW007	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.04
MW080	On-Base	28 Nov 2018	ROBMW07	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.02	0.05	0.1
MW080	On-Base	01 May 2019	ROBMW07	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW080	On-Base	18 Dec 2019	1200_QC101_191218	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
MW080	On-Base	18 Dec 2019	1200_QC201_191218	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	-	-
MW080	On-Base	18 Dec 2019	1200_ROBMW07_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
MW080	On-Base	07 Apr 2020	1200_MW080_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
MW080	On-Base	15 Apr 2021	1200_MW080_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.07	<0.02	<0.02	0.13	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.04	0.12	0.34
MW080	On-Base	03 Nov 2021	1200_MW080_211103	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	0.01	0.03	0.03
MW080	On-Base	21 Apr 2022	1200_MW080_220422	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW080	On-Base	22 Apr 2022	1200_QC103_220422	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW080	On-Base	22 Apr 2022	1200_QC203_220422	Interlab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW080	On-Base	20 Sep 2022	1200_MW080_220920	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.01	0.07	<0.01	0.07	0.1
MW080	On-Base	21 Mar 2023	1200_MW080_230321	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.03	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.01	0.02	0.07
MW112	Off-Base	27 Nov 2018	SBRS1	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	01 May 2019	SBRS-1	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	17 Dec 2019	SBRS1 (OSP002_Bore01)	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	04 Nov 2020	1200_MW112_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	04 Nov 2020	1200_MW112-FF_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	16 Apr 2021	1200_MW112_210416	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	16 Apr 2021	1200_MW112_210416_FF	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW112	Off-Base	02 Nov 2021	0107_MW112_211102	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW112	Off-Base	21 Apr 2022	1200_MW112_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW112	Off-Base	21 Sep 2022	1200_MW112_220921	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW112	Off-Base	23 Mar 2023	1200_MW112_230323	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW113	Off-Base	27 Nov 2018	SBRS2	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	01 May 2019	SBRS-2	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	17 Dec 2019	SBRS2 (OSP002_Bore02)	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	07 Apr 2020	1200_MW113_200407	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	07 Apr 2020	1200_QC101_200407	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	07 Apr 2020	1200_QC201_200407	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<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	<0.02	<0.02	<0.01	<0.02	<0.01	-	-
MW113	Off-Base	04 Nov 2020	1200_MW113_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	04 Nov 2020	1200_MW113-FF_201104	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	16 Apr 2021	1200_MW113_210416	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	16 Apr 2021	1200_MW113_210416_FF	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
MW113	Off-Base	02 Nov 2021	0107_MW113_211102	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW113	Off-Base	21 Apr 2022	1200_MW113_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW113	Off-Base	21 Sep 2022	1200_MW113_220921	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
MW113	Off-Base	23 Mar 2023	1200_MW113_230323	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01

Notes
LOR: Limit of reporting
µg/L: micrograms per Litre
* = Results taken from MW024 as an alternate well to MW023
^ = Results taken from MW005 as an alternate well to MW004
1 = Result from April 2022 considered erroneous. May 2022 results adopted for interpretive purposes.

Table T3
Historical Surface Water Geochemical Parameters
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

Location ID	On / Off-Base	Field date	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr) (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method	Flow Direction
SW001	On-Base	22/01/2020	5.1	16	10.40	6.82	224	424.0	25.5	Clear	Clear	No odour	No sheen	Grab sample	South, flowing off-Base
SW001	On-Base	6/04/2020	73.4	48.8	31.72	6.38	165.1	365.1	35.1	Clear	No Colour	No Odour	No Sheen	Grab sample	South, flowing off-Base
SW001	On-Base	21/12/2020	3.49	83.6	54.34	7.41	181.3	381.3	30.5	Clear	Colourless	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW001	On-Base	15/04/2021	4.6	55.8	36.27	6.23	107.1	307.1	34.5	Clear	Colourless	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW001	On-Base	20/01/2022	4.37	45.3	29.45	5.58	187.2	387.2	31.7	Clear	Colourless	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW001	On-Base	22/04/2022	2.53	246.7	160.36	5.49	97.1	297.1	30.8	Clear	Colourless, algae present	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW001	On-Base	28/11/2022	1.51	77	50.05	6.9	77.7	277.7	32.6	Low	Colourless	Odourless	No Sheen	Grab Sample	Flow observed. South, flowing off-Base
SW001	On-Base	23/03/2023	1.23	55.1	35.82	5.12	134.2	334.2	29.9	Low	Colourless	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW007	On-Base	18/12/2019	2.72	65.5	42.58	6.37	241.7	441.7	35.6	-	-	No odour	-	Grab sample	South, flowing off-Base
SW007	On-Base	22/01/2020	5	13.1	8.52	7.13	197.9	397.9	24.4	Clear	Clear	No odour	No sheen	Grab sample	South, flowing off-Base
SW007	On-Base	6/04/2020	5.42	39.4	25.61	5.94	204.2	404.2	34.3	Clear	No Colour	No Odour	No Sheen	Grab sample	South, flowing off-Base
SW007	On-Base	21/12/2020	5.96	42.2	27.43	7.92	141.3	341.3	31.6	Clear	Colourless	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW007	On-Base	15/04/2021	6.8	21.7	14.11	5.42	208.8	408.8	32.8	Clear	Colourless	Hydrogen Sulphide Odour	No Sheen	Grab Sample	South, flowing off-Base
SW007	On-Base	20/01/2022	7.38	22.8	14.82	5.71	174.5	374.5	32.3	Clear	Clear	No odour	No sheen		South, flowing off-Base
SW007	On-Base	22/04/2022	3.86	53.6	34.84	6.15	72.3	272.3	32.9	Clear	Clear, algae present	No odour	No sheen		Flow observed. South, flowing off-Base
SW007	On-Base	28/11/2022	2.16	54.7	35.56	6.15	103.3	303.3	29.7	High	Pale Yellow, green algae present	Organic odour	No Sheen	Grab Sample	South, flowing off-Base
SW007	On-Base	22/03/2023	1.94	195.6	127.14	5.45	31.6	231.6	30.4	High	Colourless	Odourless	No Sheen	Grab Sample	South, flowing off-Base
SW023	On-Base	18/12/2019	Sampling location dry - unable to sample												No flow
SW023	On-Base	22/01/2020	5.7	22.1	14.37	7.12	185.2	385.2	25.2	Clear	-	No odour	No sheen	Grab sample	South west
SW023	On-Base	6/04/2020	Sampling location dry - unable to sample												No flow
SW023	On-Base	21/12/2020	Sampling location dry - unable to sample												No flow
SW023	On-Base	15/04/2021	Sampling location dry - unable to sample												No flow
SW023	On-Base	20/01/2022	4.59	32.8	21.32	5.82	181.5	381.5	30.5	High	Pale brown	No odour	No sheen	Grab sample	South west
SW023	On-Base	22/04/2022	Sampling location dry - unable to sample												No flow
SW023	On-Base	28/11/2022	2.81	62.5	40.63	6.97	275.8	475.8	27.3	Clear	Clear	Odourless	No Sheen	Grab Sample	No flow
SW023	On-Base	21/03/2023	Sampling location dry - unable to sample												No flow
SW028	On-Base	18/12/2019	Sampling location dry - unable to sample												No flow
SW028	On-Base	22/01/2020	4.2	8.8	5.72	7.16	189.2	389.2	24.8	Clear	Clear	No odour	No sheen	Grab sample	South west
SW028	On-Base	6/04/2020	Sampling location dry - unable to sample												No flow
SW028	On-Base	21/12/2020	Sampling location dry - unable to sample												No flow
SW028	On-Base	15/04/2021	Sampling location dry - unable to sample												No flow
SW028	On-Base	20/01/2022	4.73	5.6	3.64	5.84	205.6	405.6	27.9	High	Pale brown	No odour	No sheen	Grab sample	South west
SW028	On-Base	22/04/2022	Sampling location dry - unable to sample												No flow
SW028	On-Base	28/11/2022	1.94	13.5	8.78	6.35	98.5	298.5	29	Low	Colourless	Odourless	No Sheen	Grab Sample	South west
SW028	On-Base	21/03/2023	Field parameters and observations not saved - electronic data error											Grab Sample	South west
SW059	On-Base	18/12/2019	Sampling location dry - unable to sample												No flow
SW059	On-Base	22/01/2020	5	42.1	27.37	6.81	198.9	398.9	25.2	Clear	Clear	No odour	No sheen	Grab sample	East, flowing off-Base to CTA
SW059	On-Base	21/12/2020	4.17	25.5	16.58	7.74	165.3	365.3	33.2	Clear	Colourless	Odourless	No Sheen	Grab Sample	East, flowing off-Base to CTA
SW059	On-Base	20/01/2022	5.32	20.1	13.07	5.68	211.3	411.3	29.1	Clear	Colourless	Odourless	No Sheen	Grab Sample	East, flowing off-Base to CTA
SW059	On-Base	22/04/2022	4.02	68.2	44.33	6.82	105.2	305.2	34.2	Low	Slight brown	Odourless	No Sheen	Grab Sample	East, flowing off-Base to CTA
SW059	On-Base	15/04/2021	4.3	27.5	17.88	6.72	97.4	297.4	35.0	Clear	Colourless	Slight Organic Odour	No Sheen	Grab Sample	East, flowing off-Base to CTA
SW059	On-Base	24/11/2022	2.78	18.9	12.29	6.45	76.7	276.7	-	Low	Pale brown	Odourless	No Sheen	Grab Sample	No Flow
SW059	On-Base	21/03/2023	1.44	23.3	15.15	5.01	149.2	349.2	30.2	Clear	Colourless	Odourless	No Sheen	Grab Sample	East, flowing off-Base to CTA
SW075	Off-Base	18/12/2019	4.25	35.7	23.21	6.03	261	461.0	31.3	Low	Clear	No odour	No sheen	Grab sample	East, flowing to CTA
SW075	Off-Base	22/01/2020	5.2	21.8	14.17	6.84	206.9	406.9	25	Clear	Clear	No odour	No sheen	Grab sample	East, flowing to CTA
SW075	Off-Base	6/04/2020	55.5	32.8	21.32	6.11	205.1	405.1	31.3	Clear	No Colour	No Odour	No Sheen	Grab sample	East, flowing to CTA
SW075	Off-Base	15/12/2020	0.89	40.4	26.26	6.32	161.9	361.9	29.8	Clear	Colourless	Odourless	No Sheen	Grab Sample	East, flowing to CTA
SW075	Off-Base	15/04/2021	-	28.3	18.40	5.45	158.6	358.6	31.8	Clear	Colourless	Odourless	No Sheen	Grab Sample	East, flowing to CTA
SW075	Off-Base	20/01/2022	3.8	35	22.75	6.79	122.2	322.2	32.5	Clear	Colourless	Odourless	No Sheen	Grab Sample	East, flowing to CTA
SW075	Off-Base	22/04/2022	3.62	64.5	41.93	5.43	80.5	280.5	28.2	Low	Colourless	Odourless	No Sheen	Grab Sample	Flow observed. East, flowing to CTA
SW075	Off-Base	24/11/2022	3.66	17.4	11.31	6.57	80.9	280.9	-	Moderate	Pale brown	Odourless	No Sheen	Grab Sample	Flow observed. East, flowing to CTA
SW075	Off-Base	21/03/2023	Field parameters and observations not saved - electronic data error											Grab Sample	East, flowing to CTA
SW086	Off-Base	18/12/2019	3.77	40.9	26.59	5.75	167	367.0	34.9	Low	Clear	No odour	No sheen	Grab sample	North
SW086	Off-Base	22/01/2020	4.95	24.4	15.86	7.17	212.6	412.6	25.2	Clear	Clear	No odour	No sheen	Grab sample	North
SW086	Off-Base	6/04/2020	3.55	28.6	18.59	6.35	148.4	348.4	31.1	Clear	No Colour	No Odour	No Sheen	Grab sample	North
SW086	Off-Base	15/12/2020	0.89	36.1	23.47	5.76	155	355.0	29.8	Clear	Colourless	Odourless	No Sheen	Grab Sample	North
SW086	Off-Base	15/04/2021	4.7	23.5	15.28	5.31	133.2	333.2	28.8	Clear	Colourless	Odourless	No Sheen	Grab Sample	North
SW086	Off-Base	20/01/2022	3.02	40.5	26.33	6.85	109	309.0	29.6	Clear	Colourless	Odourless	No Sheen	Grab Sample	North
SW086	Off-Base	22/04/2022	4.47	58.9	38.29	6.68	58.2	258.2	29.8	Low	Colourless	Odourless	No Sheen	Grab Sample	Flow observed. North
SW086	Off-Base	24/11/2022	3.24	44.2	28.73	5.84	116.6	316.6	-	Low	Pale brown	Odourless	No Sheen	Grab Sample	Flow observed. North
SW086	Off-Base	22/03/2023	5.18	41.9	27.24	5.82	48.2	248.2	30.1	Clear	Colourless	Odourless	No Sheen	Grab Sample	Flow observed. North
SW091	Off-Base	18/12/2019	3.85	47.4	30.81	6.01	105.9	305.9	30.6	Clear	Colourless	No odour	No sheen	Grab sample	North east
SW091	Off-Base	22/01/2020	4.9	24.9	16.19	7.4	153	353.0	25.6	Clear	Colourless	No odour	No sheen	Grab sample	North east
SW091	Off-Base	6/04/2020	3.94	176.1	114.47	7.09	97.5	297.5	30.3	Clear	Colourless	No Odour	No Sheen	Grab sample	North east
SW091	Off-Base	15/12/2020	1.57	119.9	77.94	8.4	84	284.0	30.6	Clear	Colourless	Odourless	No Sheen	Grab Sample	North east
SW091	Off-Base	15/04/2021	4.8	25.7	16.71	7.90	70.1	270.1	28.5	Clear	Colourless	Odourless	No Sheen	Grab Sample	North east

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SW091	Off-Base	20/01/2022	3.5	27.1	17.62	6.44	117.2	317.2	29.7	Clear	Colourless	Odourless	No Sheen	Grab Sample	North east
SW091	Off-Base	22/04/2022	4.07	55.8	36.27	5.91	70.2	270.2	29.9	Low	Slight brown	Odourless	No Sheen	Grab Sample	Flow observed. North east
SW091	Off-Base	24/11/2022	3.48	18.3	11.90	6.17	94.3	294.3	-	Low	Pale brown	Odourless	No Sheen	Grab Sample	Flow observed. North east
SW091	Off-Base	23/03/2023	5.62	44.3	28.80	6.09	38.4	238.4	30.1	High	Colourless	Odourless	No Sheen	Grab Sample	Flow observed. North east
SW123	Off-Base	18/12/2019	1.2	37.5	24.38	5.43	151.8	351.8	30.2	Low	Light Brown	No odour	No Sheen	Grab sample	North east
SW123	Off-Base	6/04/2020	2.56	26.8	17.42	6.27	165.3	365.3	31.3	Clear	No Colour	No Odour	No Sheen	Grab sample	North east
SW123	Off-Base	15/12/2020	0.56	37.1	24.12	7.94	139.6	339.6	34.7	Clear	Colourless	Odourless	No Sheen	Grab Sample	North east
SW123	Off-Base	15/04/2021	3.6	19.1	12.42	6.23	114.9	314.9	29.3	Clear	Colourless	Odourless	No Sheen	Grab Sample	North east
SW123	Off-Base	20/01/2022	2.92	21.5	13.98	6.72	144.5	344.5	29.1	Clear	Colourless	Odourless	No Sheen	Grab Sample	North east
SW123	Off-Base	22/04/2022	4	49.2	31.98	5.77	-	-	29.6	Low	Slight yellow	Odourless	No Sheen	Grab Sample	Flow observed. North east
SW123	Off-Base	24/11/2022	3.19	26.7	17.36	6.23	80.4	280.4	-	Clear	Colourless	Slight organic odour	No Sheen	Grab Sample	Flow observed. North east
SW123	Off-Base	23/03/2023	4.94	34.8	22.62	5.93	44.5	244.5	29.7	Clear	Colourless	Odourless	No Sheen	Grab Sample	Flow observed. North east

Notes:
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius
Redox Corrected = redox potential relative to the standard hydrogen electrode (Eh = Er + 200mV)

Table T4
Historical Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

					PFAS (Full Suite)																												
					10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	PFOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	µg/L	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					0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																																	
PFAS NEMP (2020) FW 99% Species Protection																														19	0.0002			
Human Health Receptors																																	
PFAS NEMP 2020 Recreational Water																														10			2	
Location Code	**On / Off-Base**	**Date**	**Field ID**	**Sample Type**																														
SW001	On-Base	19 Jul 2017	SW01	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.06	0.03	0.09	0.09
SW001	On-Base	04 Oct 2017	SW001	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	<0.03	0.05	0.05
SW001	On-Base	02 Feb 2018	SW001	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.04	0.09	0.11
SW001	On-Base	22 Jan 2020	1200_SW001_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW001	On-Base	06 Apr 2020	1200_SW001_200406	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	<0.02	0.04	0.06
SW001	On-Base	21 Dec 2020	1200_SW001_201221	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	<0.02	0.03	0.03
SW001	On-Base	15 Apr 2021	1200_SW001_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW001	On-Base	20 Jan 2022	1200_SW001_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	0.01	0.03	0.03
SW001	On-Base	21 Apr 2022	1200_SW001_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.01	0.02	0.02
SW001	On-Base	28 Nov 2022	1200_SW001_221128	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.01	0.01	0.01
SW001	On-Base	22 Mar 2023	1200_SW001_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.02	0.05	0.05
SW007	On-Base	19 Jul 2017	SW07	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	<0.02	0.04	0.04
SW007	On-Base	02 Feb 2018	SW007	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW007	On-Base	01 May 2019	SW007	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW007	On-Base	18 Dec 2019	1200_SW007_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.01	<0.01	<0.02	<0.01	0.01
SW007	On-Base	22 Jan 2020	1200_SW007_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW007	On-Base	06 Apr 2020	1200_SW007_200406	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW007	On-Base	21 Dec 2020	1200_SW007_201221	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW007	On-Base	21 Dec 2020	1200_QC200_201221	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	-	-
SW007	On-Base	15 Apr 2021	1200_SW007_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW007	On-Base	20 Jan 2022	1200_SW007_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW007	On-Base	21 Apr 2022	1200_SW007_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW007	On-Base	28 Nov 2022	1200_SW007_221128	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW007	On-Base	22 Mar 2023	1200_SW007_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	0.02	0.06	0.06
SW023	On-Base	03 Feb 2018	SW023	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.01	<0.02	0.01	0.08
SW023	On-Base	22 Jan 2020	1200_SW023_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW023	On-Base	20 Jan 2022	1200_SW023_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW023	On-Base	28 Nov 2022	1200_SW023_221128	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW028	On-Base	02 Feb 2018	SW028	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.1	0.18	0.18
SW028	On-Base	22 Jan 2020	1200_SW028_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW028	On-Base	20 Jan 2022	1200_SW028_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW028	On-Base	28 Nov 2022	1200_SW028_221128	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW028	On-Base	21 Mar 2023	1200_SW028_230321	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW028	On-Base	21 Mar 2023	1200_QC110_230321	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW028	On-Base	21 Mar 2023	1200_QC210_230321	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	-	-
SW059	On-Base	01 Feb 2018	SW059	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.05	<0.02	<0.02	<0.02	0.02	<0.02	0.11	<0.02	<0.02	0.03	0.06	<0.05	<0.02	<0.02	0.03	0.38	0.29	0.67	0.97
SW059	On-Base	27 Nov 2018	SW059	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW059	On-Base	27 Nov 2018	QC101	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW059	On-Base	27 Nov 2018	QC201	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<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	<0.01	<0.01	0.01	<0.01	0.01	<0.1
SW059	On-Base	01 May 2019	SW059	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.12	<0.02	0.12	0.12
SW059	On-Base	01 May 2019	QC113	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW059	On-Base	01 May 2019	QC213	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<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	<0.01	<0.01	0.02	<0.01	0.02	<0.1
SW059	On-Base	22 Jan 2020	1200_SW059_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.06	0.02	0.08	0.08
SW059	On-Base	21 Dec 2020	1200_SW059_201221	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW059	On-Base	21 Dec 2020	1200_QC100_201221	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01

Table T4
Historical Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

	PFAS (Full Suite)																														
	10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	PFOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																														
PFAS NEMP (2020) FW 99% Species Protection																										19	0.0002			
Human Health Receptors																														
PFAS NEMP 2020 Recreational Water																										10			2	

Location Code	On / Off-Base	Date	Field ID	Sample Type																													
SW059	On-Base	15 Apr 2021	1200_SW059_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.02	0.05	0.05
SW059	On-Base	20 Jan 2022	1200_SW059_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW059	On-Base	21 Apr 2022	1200_SW059_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.18	0.07	0.25	0.27
SW059	On-Base	24 Nov 2022	1200_SW059_221124	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	<0.01	0.03	0.03
SW059	On-Base	24 Nov 2022	1200_QC100_221124	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	<0.01	0.03	0.03
SW059	On-Base	24 Nov 2022	1200_QC200_221124	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	0.026	<0.01	-	-
SW059	On-Base	21 Mar 2023	1200_SW059_230321	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.17	0.05	0.22	0.25
SW075	Off-Base	17 Oct 2017	SW075	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.06	<0.02	0.06	0.06
SW075	Off-Base	02 Feb 2018	SW075	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW075	Off-Base	23 May 2018	SW075	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.09	0.04	0.13	0.13
SW075	Off-Base	23 May 2018	QC139	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.08	0.03	0.11	0.11
SW075	Off-Base	24 May 2018	QC239	Interlab Dup	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<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	0.08	0.04	0.12	0.16
SW075	Off-Base	27 Nov 2018	SW075	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.07	0.04	0.11	0.11
SW075	Off-Base	30 Apr 2019	SW075	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.08
SW075	Off-Base	18 Dec 2019	1200_SW075_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW075	Off-Base	22 Jan 2020	1200_SW075_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW075	Off-Base	06 Apr 2020	1200_SW075_200406	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW075	Off-Base	15 Dec 2020	1200_SW075_201215	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW075	Off-Base	15 Apr 2021	1200_SW075_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW075	Off-Base	20 Jan 2022	1200_SW075_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	0.01	0.03	0.03
SW075	Off-Base	20 Jan 2022	1200_QC100_220120	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	0.01	0.02	0.02
SW075	Off-Base	20 Jan 2022	1200_QC200_220120	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	-	-
SW075	Off-Base	21 Apr 2022	1200_SW075_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW075	Off-Base	24 Nov 2022	1200_SW075_221124	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.01	0.01	0.01
SW075	Off-Base	23 Mar 2023	1200_SW075_230323	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.01	0.01	0.01
SW086	Off-Base	01 Feb 2018	SW086	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	27 Nov 2018	SW086	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	30 Apr 2019	SW086	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	18 Dec 2019	1200_SW086_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	18 Dec 2019	1200_QC202_191218	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	-	-
SW086	Off-Base	18 Dec 2019	1302_QC102_191218	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	22 Jan 2020	1200_SW086_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	06 Apr 2020	1200_SW086_200406	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.03	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	06 Apr 2020	1200_QC100_200406	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	06 Apr 2020	1200_QC200_200406	Interlab Dup	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	-	-
SW086	Off-Base	15 Dec 2020	1200_SW086_201215	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW086	Off-Base	15 Apr 2021	1200_SW086_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW086	Off-Base	20 Jan 2022	1200_SW086_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW086	Off-Base	21 Apr 2022	1200_SW086_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW086	Off-Base	24 Nov 2022	1200_SW086_221124	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
SW086	Off-Base	22 Mar 2023	1200_SW086_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.01	0.01	0.01
SW091	Off-Base	19 Oct 2017	SW091	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.08
SW091	Off-Base	01 Feb 2018	SW091	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW091	Off-Base	27 Nov 2018	SW091	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.03	0.08	0.08
SW091	Off-Base	30 Apr 2019	SW091	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	<0.02	0.03	0.03
SW091	Off-Base	18 Dec 2019	1200_SW091_191219	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	0.03	0.07	0.07
SW091	Off-Base	22 Jan 2020	1200_SW091_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW091	Off-Base	22 Jan 2020	1200_QC100_200122	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW091	Off-Base	06 Apr 2020	1200_SW091_200406	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW091	Off-Base	15 Dec 2020	1200_SW091_201215	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.04	<0.02	0.04	0.04
SW091	Off-Base	15 Apr 2021	1200_SW091_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW091	Off-Base	15 Apr 2021	1200_QC102_210415	Intralab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW091	Off-Base	15 Apr 2021	1200_QC202_210415	Interlab Dup	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW091	Off-Base	20 Jan 2022	1200_SW091_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.01	0.02	0.02

Table T4
Historical Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

	PFAS (Full Suite)																														
	10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBA	PFBS	PFDA	PFDS	PFDoDA	PFHpA	PFHpS	PFHxA	PFNA	PFOSA	PFPeA	PFPeS	PFTeDA	PFTrDA	PFUnDA	PFOA	PFOS	PFHxS	Sum of PFHxS and PFOS	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	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.005	0.005	0.005	0.005	0.02	0.01	0.05	0.02	0.01	0.05	0.01	0.002	0.01	0.01	0.01	0.002	0.01	0.002	0.01	0.01	0.002	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.002	0.01
Ecological Receptors																														
PFAS NEMP (2020) FW 99% Species Protection																										19	0.0002			
Human Health Receptors																														
PFAS NEMP 2020 Recreational Water																										10			2	

Location Code	On / Off-Base	Date	Field ID	Sample Type																													
SW091	Off-Base	21 Apr 2022	1200_SW091_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	0.01	0.03	0.03
SW091	Off-Base	24 Nov 2022	1200_SW091_221124	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.05	0.01	0.06	0.06
SW091	Off-Base	22 Mar 2023	1200_SW091_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	0.01	0.01	0.01
SW123	Off-Base	01 Feb 2018	SW123	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.14	0.07	0.21	0.23
SW123	Off-Base	23 May 2018	SW123	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01
SW123	Off-Base	18 Dec 2019	1200_SW123_191218	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.03	0.03	0.06	0.06
SW123	Off-Base	22 Jan 2020	1200_SW123_200122	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.01	<0.02	0.01	0.01
SW123	Off-Base	06 Apr 2020	1200_SW123_200406	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW123	Off-Base	15 Dec 2020	1200_SW123_201215	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW123	Off-Base	15 Apr 2021	1200_SW123_210415	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	0.02
SW123	Off-Base	20 Jan 2022	1200_SW123_220120	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	0.01	0.03	0.03
SW123	Off-Base	21 Apr 2022	1200_SW123_220421	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	0.02	0.04	0.04
SW123	Off-Base	24 Nov 2022	1200_SW123_221124	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.01	0.2	0.05	0.25	0.28
SW123	Off-Base	27 Nov 2018	SW123	Primary	<0.05	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.23	0.11	0.34	0.4
SW123	Off-Base	22 Mar 2023	1200_SW123_230322	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.1	0.06	<0.02	<0.02	<0.02	0.07	<0.02	0.30	<0.02	<0.02	0.03	0.06	<0.05	<0.02	<0.02	0.15	0.01	0.34	0.35	1.02

Notes
µg/L: micrograms per Litre
LOR: Limit of reporting

Table T5
Historical Sediment Field Observations
PFAS OMP
Department of Defence - Roberston Barracks

AECOM

Sediment Field Observations						
Location ID	**On / Off-Base**	**Sampled Date**	**Sediment Colour**	**Sediment Characteristics**	**Sediment Odour**	**Sample Method**
SD001	On-Base	15/04/2021	Reddy Brown	Silty SAND with gravels up to 15mm present.	Odourless	Grab Sample
SD001	On-Base	21/04/2022	Brown	Silty SAND; with fine-coarse gravels, with rootlets, pooled water	Odourless	Grab Sample
SD007	On-Base	15/04/2021	Grey	No additional observations recorded	Organic Odour	Grab Sample
SD007	On-Base	21/04/2022	Brown	SILT; with fine-coarse grained sands, trace gravels and organics, algae present, flow observed	Odourless	Grab Sample
SD023	On-Base	15/04/2021	Reddish Yellow	Fine SAND with lateritic and pea gravel (up to 10mm) present	Odourless	Grab Sample
SD023	On-Base	20/04/2022	Red-brown	SAND; fine-coarse grained, with fine-medium grained gravels, dry, no water	Odourless	Grab Sample
SD028	On-Base	15/04/2021	Grey Brown	Silty SAND with minimal gravels of pea gravels up to 2mm present.	Odourless	Grab Sample
SD028	On-Base	20/04/2022	Brown	Clayey SILT; with fine sands and rootlets, moist, no water	Odourless	Grab Sample
SD059	On-Base	15/04/2021	Reddish	Course SAND with lateritic and pea gravels present.	Odourless	Grab Sample
SD059	On-Base	21/04/2022	Red-brown	SAND; fine-coarse grained gravels, trace organics, algae present, pooled water	Odourless	Grab Sample
SD075	Off-Base	15/04/2021	Grey	Silty SAND with some gravels present	Odourless	Grab Sample
SD075	Off-Base	21/04/2022	Grey-brown	Silty SAND; with fine-coarse gravels and rootlets, wet, flow observed	Odourless	Grab Sample
SD086	Off-Base	15/04/2021	Brown	Gravelly SAND (gravels up to 5mm) with some fine, organic particulate matter present.	Odourless	Grab Sample
SD086	Off-Base	21/04/2022	Brown	SAND; fine-coarse grained, with fine-coarse grained gravels and low plasticity clay, trace rootlets, wet, flow observed	Odourless	Grab Sample
SD091	Off-Base	15/04/2021	No Colour Noted	Field observations not recorded	No Odour Noted	Grab Sample
SD091	Off-Base	21/04/2022	Brown	SAND; with fine-coarse gravels and rootlets, wet, flow observed	Odourless	Grab Sample
SD123	Off-Base	15/04/2021	Brown	Silty SAND with lateritic gravels up to 10mm present.	Organic Odour	Grab Sample
SD123	Off-Base	21/04/2022	Brown	Silty SAND; fine-coarse grain gravels, trace rootlets, wet, flow observed	Odourless	Grab Sample

Table T6
Historical Sediment Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

AECOM

					PFAS (Full Suite)																														
					6:2 FTS	8:2 FTS	10:2 FTS	PFBS	PFHxS	PFOS	PFOSA	PFOSAA	PFHxSAA	PFDSAA	PFNS	PFDS	PFHpA	PFHxA	PFPeA	PFBA	PFHpS	PFHxS	PFPeS	PFNA	PFOA	PFDA	PFUnDA	PFDoA	PFTrDA	PFTeDA	Sum of PFAS	Sum of PFHxS and PFOS
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002
Location Code	**On / Off-Base**	**Date**		**Sample Type**																															
SD001	On-Base	04 Oct 2017	1200_SD001_171004	Normal	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	0.0008	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0072	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.009	0.0072
SD001	On-Base	02 Feb 2018	1200_SD001_180202	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0032	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0035	0.0032
SD001	On-Base	01 May 2019	1200_SD001_190501	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0015	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0015	0.0015
SD001	On-Base	15 Apr 2021	1200_SD001_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD001	On-Base	21 Apr 2022	1200_SD001_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003
SD007	On-Base	10 Oct 2017	1200_SD007_171010	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD007	On-Base	02 Feb 2018	1200_SD007_180202	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD007	On-Base	01 May 2019	1200_SD007_190501	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD007	On-Base	06 Apr 2020	1200_SD007_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD007	On-Base	15 Apr 2021	1200_SD007_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD007	On-Base	21 Apr 2022	1200_SD007_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD023	On-Base	07 Oct 2017	1200_SD023_171007	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD023	On-Base	03 Feb 2018	1200_SD023_180203	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD023	On-Base	01 May 2019	1200_SD023_190501	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD023	On-Base	06 Apr 2020	1200_SD023_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD023	On-Base	15 Apr 2021	1200_SD023_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD023	On-Base	20 Apr 2022	1200_SD023_220420	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD028	On-Base	09 Oct 2017	1200_SD028_171009	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	0.0006	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0015	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0026	0.0015
SD028	On-Base	02 Feb 2018	1200_SD028_180202	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0008	0.0003
SD028	On-Base	01 May 2019	1200_SD028_190501	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0004	0.0004
SD028	On-Base	06 Apr 2020	1200_SD028_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0012	0.0009
SD028	On-Base	15 Apr 2021	1200_SD028_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0005	0.0005
SD028	On-Base	20 Apr 2022	1200_SD028_220420	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD059	On-Base	07 Oct 2017	1200_SD059_171007	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.002	<0.0002
SD059	On-Base	01 Feb 2018	1200_SD059_180201	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0002	0.0002
SD059	On-Base	01 May 2019	1200_SD059_190501	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD059	On-Base	01 May 2019		Intralab Dup	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD059	On-Base	01 May 2019		Interlab Dup	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.01	<0.005	<0.01	<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	<0.005	<0.005	<0.005	<0.005
SD059	On-Base	06 Apr 2020	1200_SD059_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0002	0.0002
SD059	On-Base	15 Apr 2021	1200_SD059_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD059	On-Base	21 Apr 2022	1200_SD059_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0004	0.0004
SD075	Off-Base	17 Oct 2017	1200_SD075_171017	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0014	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0014	0.0014
SD075	Off-Base	02 Feb 2018	1200_SD075_180202	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0003	0.0003
SD075	Off-Base	23 May 2018	1200_SD075_180523	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0014	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0014	0.0014
SD075	Off-Base	23 May 2018		Intralab Dup	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0012	0.0012
SD075	Off-Base	24 May 2018		Interlab Dup	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.01	<0.005	<0.01	<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	<0.005	<0.005	<0.005	<0.005
SD075	Off-Base	30 Apr 2019	1200_SD075_190430	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0007	0.0007
SD075	Off-Base	06 Apr 2020	1200_SD075_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0007	0.0007
SD075	Off-Base	15 Apr 2021	1200_SD075_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD075	Off-Base	21 Apr 2022	1200_SD075_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0026	0.0013
SD086	Off-Base	19 Oct 2017	1200_SD086_171019	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0008	0.0008
SD086	Off-Base	30 Apr 2019	1200_SD086_190430	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD086	Off-Base	06 Apr 2020	1200_SD086_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD086	Off-Base	06 Apr 2020	1200_QC200_200406	Interlab Dup	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD086	Off-Base	06 Apr 2020	1200_QC200_200406	Interlab Dup	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.002	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.001	-		
SD086	Off-Base	15 Apr 2021	1200_SD086_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD086	Off-Base	21 Apr 2022	1200_SD086_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.005	0.005
SD091	Off-Base	19 Oct 2017	1200_SD091_171019	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0012	0.0012
SD091	Off-Base	01 Feb 2018	1200_SD091_180201	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0017	<0.0002	0.001	<0.0005	<0.0002	<0.0002	0.0027	0.0017
SD091	Off-Base	30 Apr 2019	1200_SD091_190430	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0002	0.0002
SD091	Off-Base	15 Apr 2021	1200_SD091_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0002
SD091	Off-Base	15 Apr 2021	1200_QC103_210415	Intralab Dup	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD091	Off-Base	15 Apr 2021	1200_QC203_210415	Interlab Dup	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD091	Off-Base	21 Apr 2022	1200_SD091_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
SD123	Off-Base	01 Feb 2018	1200_SD123_180201	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0004	<0.0002	<0.0002	0.0068	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0078	0.0072
SD123	Off-Base	22 May 2018	1200_SD123_180522	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	0.0004	<0.0002	<0.0002	0.0018	0.0004	<0.0002	<0.0005	<0.0002	<0.0002	0.0028	0.0022
SD123	Off-Base	06 Apr 2020	1200_SD123_200406	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0003	<0.0002	<0.0005	<0.0002	<0.0002	0.0007	0.0004
SD123	Off-Base	15 Apr 2021	1200_SD123_210415	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.0002	<0.0002
SD123	Off-Base	21 Apr 2022	1200_SD123_220421	Normal	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0004	<0.0002	<0.0005	<0.0002	<0.0002	0.0011	0.0007

Notes
LOR: Limit of reporting
mg/Kg: milligram / Kilogram

Appendix C

SAQP and Factual Reports

Appendix C SAQP and Factual Reports

Prepared for
Department of Defence, Directorate of PFAS Remediation, Environment and Engineering Branch
ABN: 68 706 814 312

AECOM

Sampling Analysis and Quality Plan

14-Sep-2022
PFAS OMP - Robertson Barracks
Doc No. 60612561_OMP_Robertson Barracks_SAQP_201901029

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Delivering a better world

Sampling Analysis and Quality Plan

Client: Department of Defence,
Directorate of PFAS Remediation,
Environment and Engineering Branch

ABN: 68 706 814 312

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14-Sep-2022

Job No.: 60612561

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document Sampling Analysis and Quality Plan

Ref 60612562_Robertson Barracks_OMP_SAQP_Rev 2_20220913.docx

Date 14-Sep-2022

Prepared by [redacted]

Reviewed by [redacted]

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	21-Jan-2020	Final	[redacted] Senior Environmental Scientist	[redacted]
1	08-Oct-2021	Revised Final	[redacted] Principal Environmental Scientist	
2	14-Sep-2022	Updated Final	[redacted] Principal Environmental Scientist	

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1.0 Introduction

1.1 Preamble

In July 2019, AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement routine monitoring programs for per- and poly-fluoroalkyl substances (PFAS) over a two-year period at selected Defence sites within the following four Defence regions:

- New South Wales and Jervis Bay Territories (excluding Riverina) Region (NSW & ACT);
- North Queensland Region (North QLD);
- South Queensland Region (South QLD);
- South Australia and Northern Territory Region (SA & NT).

This Sampling Analysis and Quality Plan (SAQP) has been prepared in relation to the proposed Ongoing Monitoring Plan (OMP) (Senversa, 2018c) works at the Robertson Barracks (the Site) (**Figure 1, Appendix B**) in the **NT & SA Region**. Robertson Barracks is located approximately 17 km east of the central business district of Darwin, NT. For the purposes of reporting, the "Base" will be in reference to Robertson Barracks, Close Training area (CTA) and Shoal Bay Receiving Station.

1.2 SAQP Objectives

The objectives of this SAQP are to:

- Define the proposed scope of works in detail;
- Outline the proposed sampling methodology and procedures to be adopted;
- Outline the proposed quality assurance and quality control (QAQC) measures to be adopted; and
- Define the data collection and management requirements for the project.

1.3 Scope of Works

To meet the OMP objectives, the following scope of works are proposed for an approximate two-year monitoring period (September/October 2022 to July 2024) as detailed in the Site OMP (Senversa, 2018c). The initial three-year monitoring period (August 2019 to August 2022) is completed.

Table 1 Scope of works (annual schedule)

Sample Matrix	Number of Sample Locations	Laboratory Analysis	Frequency	Number of Monitoring Events	Approximate Monitoring Period
Groundwater (on-Base and off-Base)	18 monitoring locations	Standard PFAS Laboratory Suite	Biannual	2	End-Wet season (April/May), and end-Dry season (September/October)
Surface water (on-Base and off-Base)	9 monitoring locations	Standard PFAS Laboratory Suite	Biannual	2	Start-Wet season (undertaken as soon as practicable after a first flush rain event; greater than 100mm rainfall, nominally December/January), and end-Wet season (April/May),

2.0 Site Identification

2.1 Site Details

Robertson Barracks is located on Thorngate Road, approximately 17 km east of the Central Business District of Darwin, NT. The Barracks are a major training ground for the Australian Defence Force and the home of Australia's 1st Brigade. This facility includes a range of land uses including a helicopter airfield and associated infrastructure in the northern portion with wash bays, refuelling areas, dangerous goods stores and mechanical maintenance areas within various compounds across Robertson Barracks. Ancillary uses include residential housing for personnel, catering kitchens, sports and recreational facilities and a childcare centre.

The area surrounding Robertson Barracks contains predominately semi-rural residential land uses, with open wetland and swamp areas, quarrying areas and The Close Training Area (CTA) located to the east of Robertson Barracks. The CTA was recently acquired by Defence and is currently being developed for the use of live fire range field training.

The Robertson Barracks Management Area (as defined in **Figure 1, Appendix B**) covers 723.4 hectares (ha) (7.23 km^2), comprising

1. Robertson Barracks.
2. The southern drainage channel (SDC) running along the southern boundary of the Barracks.
3. A portion of the CTA

Two groundwater abstraction bores used for potable purposes at the Shoal Bay Receiving Station (SBRS) have also been included within the OMP upon request by Defence. The SBRS groundwater abstraction bores are located approximately 5.6 km north of Robertson Barracks.

2.2 Conceptual Site Model

The Conceptual Site Model (CSM) is presented in the Human Health and Ecological Risk Assessment (HHERA) report (Senversa, 2018a) and the Detailed Site Investigation (DSI) (Senversa, 2018b) which summarises the linkages between sources, exposure pathways and receptors and PFAS extents.

The DSI identified PFAS impacts associated with three source areas at the facility, as follows:

- **Source Area 1**: the former Emergency Response Squadron (ERS) compound within Building 137 and immediate surrounds (Contaminated sites register (CSR) number – CSR_NT_000162).
- **Source Area 2:** 17 Combat Service Support BDE Elements where the ERS parked their trucks prior to moving to Building 137 (CSR number – CSR_NT_000133, CSR_NT_000165 and CSR_NT_000245).
- **Source Area 3:** Wash down bays and refuelling areas within the southern portion of Robertson Barracks. The drainage network also culminates in this area of Robertson Barracks (CSR number – CSR_NT_000241 and CSR_NT_000108).

3.0 Data Quality Assessment

3.1 Data Quality Objectives

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

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

The process of establishing appropriate DQOs is defined according to the following seven steps (Table 2):

Table 2 The seven steps in defining DQOs

Step	Data Quality Objective Step
1	***State the problem*** – Define the problem that necessitates the study; identify the planning team, examine budget, schedule.
2	***Identify the goal of the study*** – State how environmental data will be used in meeting objectives and solving the problem, identify study questions, define alternative outcomes.
3	***Identify information inputs*** – Identify data and information needed to answer study questions.
4	***Define the boundaries of the study*** – Specify the target population and characteristics of interest, define spatial and temporal limits, scale of inference.
5	***Develop the analytic approach*** – Define the parameter of interest, specify the type of inference, and develop the logic for drawing conclusions from findings.
6	***Specify performance or acceptance criteria*** – Develop performance criteria for new data being collected or acceptable criteria for existing data being considered for use.
7	***Develop the plan for obtaining data*** – Select the resource-effective sampling and analysis plan that meets the performance criteria.

The approach adopted relative to the seven steps presented above is discussed below.

3.1.1 Step 1 – State the Problem

Concentrations of PFAS exceeding adopted screening levels have been detected in groundwater, surface water and sediment within the Management Area including the southern drainage channel and in Milners Creek located outside of Robertson Barracks. These elevated concentrations are not considered to pose a significant risk to human health through recreational direct contact (incidental ingestion/ dermal contact), however are contributing to a potentially elevated risk for ecosystem receptors and the potential consumption of fish and molluscs by humans. Furthermore, the concentration trends in surface water, sediment and groundwater are not well understood based on the available monitoring data.

3.1.2 Step 2 – Identify the Goal of the Study

The overall goal of the study is to establish a systematic routine groundwater, surface water and sediment sampling and analysis program to provide current and ongoing information on the distribution and concentrations of PFAS in the Management Area.

Specific goals of the program are to:

- understand the changes and trends in the nature, extent and magnitude of PFAS concentrations in the groundwater, surface water and sediment within the Management Area
- understand if the nature, extent and magnitude of PFAS concentrations has changed significantly to warrant a revision to the human health and environmental risk assessments
- understand if the nature, extent and magnitude of PFAS concentrations have changed significantly to warrant refinement of any existing management measures.

3.1.3 Step 3 – Identify Information Inputs

To allow assessment of the data against the study goal listed in Step 2 above, the following inputs will be considered:

- PFAS results from previous environmental investigations
- meteorological data including rainfall
- groundwater, surface water and sediment sample data collected and analysed for PFAS
- groundwater elevation data
- surface water conditions at time of sampling of surface water and sediment
- site status and land use scenarios and whether conditions and uses have changed.
- statistical analysis to identify trends
- advances in laboratory analytical approaches and changes in regulatory requirements.

Key inputs to the decisions also include field observations and measurements, sample collection, preservation, storage, transportation and documentation for each media of concern, analytical methods, field and laboratory QA/QC, validation data obtained from the laboratory analysis.

3.1.4 Step 4 – Define the Boundaries of the Study

The spatial and temporal boundaries that apply for data collection are detailed below and will influence the decision-making process for ongoing monitoring:

- The spatial boundary for data collection and decision making is limited to the Management Area shown in Figure 1.
- The sampling completed as part of the OMP (Senversa, 2018c) will be limited to groundwater, surface water and sediment at the frequencies defined in Section 4.0.
- The monitoring will occur over a further 2 years and the need for ongoing monitoring thereafter will then be considered.

3.1.5 Step 5 – Develop the Analytical Approach

The data will be used to assess whether PFAS impacts as a result of historical use of Aqueous Film-Forming Foam (AFFF) at Robertson Barracks have changed in nature and extent which may alter the understanding or assessment of identified risks into the future to human or ecological receptors.

The decision rules can be defined as:

- Analytical selection; all samples will be analysed for the extended PFAS suite.
- Analytical method selection for PFAS is based on achieving appropriate laboratory limit of reporting (LOR) in the various media to be analysed.
- Sample locations have been selected with the objective of monitoring PFAS trends (temporal and seasonal), providing early warning of changes in the migration of PFAS in surface water and groundwater.
- If the laboratory quality assurance/quality control data are within the acceptable ranges, the data will be considered suitable for use.

- If PFAS concentrations are reported above the laboratory LOR, where it was previously <LOR, then it will be considered whether further assessment of the data will be required.
- If PFAS concentrations are reported above the drinking water guideline from either of the abstraction bores at SBRS, then assessment of management controls regarding groundwater use in the area should be considered and further risk assessment of potential exposure pathways associated with groundwater use.
- If PFAS is reported at a concentration that is above recreational use guideline in Milners Creek and if access restrictions (fencing) have been ineffective, then re-assess the PMAP management responses to remove the potentially complete pathway.

The decision on the acceptance of the analytical data should be made on the basis of the Data Quality Indicators (DQIs) as follows:

- **Precision:** A quantitative measure of the variability (or reproducibility) of data.
- **Accuracy**: A quantitative measure of the closeness of reported data to the “true” value.
- **Representativeness**: The confidence (expressed qualitatively) that data are representative of each media present on Site.
- **Completeness**: A measure of the amount of useable data from a data collection activity.
- **Comparability**: The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event.

The decisions to be made from investigation results include the following:

3.1.6 Step 6 – Specify Performance or Acceptance Criteria

Specific limits for the works included in the OMP (Senversa, 2018c) are in accordance with the appropriate guidance made or endorsed by state and national regulations, appropriate indicators of data quality, and standard procedures for field sampling and handling.

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

- A decision can be made based on a certainty assumption of 95% confidence in any given data set. A limit on the decision error will be 5% that a conclusive statement may be a false positive or false negative.
- A decision error in the context of the decision rule presented above would lead to either underestimation or overestimation of the risk level associated with a particular sampling area.
- Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the site. To address this, alternate locations may be sampled or additional sampling events may be conducted.

  There may be limitations in the data if aspects of the OMP (Senversa, 2018c) cannot be implemented, such as:

  - Surface water or groundwater sample locations may be dry at the time of sampling.
  - Groundwater sampling locations are damaged or destroyed and therefore cannot be sampled.
  - Access to some sampling locations could be being restricted due to operational activities or inaccessible due to weather.
- Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this the following measures are proposed:
  - Collection of sufficient sample mass to facilitate analysis reported to standard laboratory detections limits. Collection of insufficient sample mass may result in raised detection limits.
  - Field staff to follow a standard procedure when collecting samples, including decontamination of tools, and use of appropriate sample containers and preservation methods.

- Laboratories to follow a standard procedure when preparing samples for analysis and undertaking analysis.
- Laboratories to report quality assurance/quality control data for comparison with the DQIs established for the SAQP.

3.1.7 Step 7 – Optimise the Design for Obtaining Data

The methodology presented in this SAQP is designed to meet the Project objectives and to achieve the nominated DQOs. Optimisation of the data collection process will be achieved by:

- Working closely with the analytical laboratories and sampling equipment suppliers to ensure that appropriate procedures and processes are developed and implemented prior to and during the fieldwork, to ensure that sample handling, and transport to and processing by the analytical laboratories is appropriate.
- Conducting sampling according to Defence and Australian Standards for the type of sampling being conducted (i.e. groundwater monitoring well sampling versus landholder bore water sampling). These standards are as follows:
  - Department of Defence (July 2018, Amended August 2019), *Contamination Management Manual*
  - Standards Australia (AS/NZS5667.11–1998) Water Quality – Sampling, part 11: *Guidance on sampling of groundwater*.
  - Standards Australia (AS 4482.1-2005) *Guide to the sampling and investigation of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds*.
  - Standards Australia (AS 4482.2-1999) *Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile Substances*.
- Conducting sampling in accordance with AECOM's internal PFAS Sample Collection Guidance.
- Sampling conducted by suitably qualified and experienced field staff.
- Basing the sampling upon a CSM developed using the information available at the implementation of the SAQP. Updating the CSM as new data becomes available in the course of the implementation of the SAQP, as required.
- Progressive review of the data throughout the two-year OMP period and modification of sampling programs to optimise the value of data generated.

If the objectives of the SAQP are not being met, the sampling design and approach will be reviewed and amended, as required.

3.2 Assessment of Data Quality

The quality of data collected as part of the sampling will be assessed on a range of factors including:

- Documentation and data completeness; and
- Data quality – comparability, representativeness, precision and accuracy of the analytical data.

The project target for data completeness is to achieve 95% of data as suitable for use.

The acceptance criteria for DQIs for samples are specified in Table 3.

Table 3 Acceptance Criteria for Data Quality Indicators for Sample Analysis

Data Quality Indicators	Acceptance Criteria
Water and Sediment Samples	
Rinsate Blanks (where sampling equipment is reused)	Less than the laboratory LOR.
Field Blanks	Less than the laboratory LOR.

Data Quality Indicators	Acceptance Criteria
Field duplicates/Inter-lab duplicates	The relative percentage differences (RPDs) will be assessed as acceptable if less than or equal to 30% as per the NEPM Schedule B3. Where the results show greater than 30% difference a review of the cause will be conducted (NEPM, 2013). It is noted that RPDs that exceed this range may be considered acceptable where: • Results are less than 10 times the LOR (no limit); • Results are less than 20 times the LOR and the RPD is less than 50%; and • Heterogeneous materials are encountered.
Laboratory duplicates	RPDs less than: • 20% for high level laboratory duplicates (i.e. >20 x LOR); and • 50% for medium level laboratory duplicates (i.e. 10 to 20 x LOR).
Matrix spikes	Recoveries between 70-130% of the theoretical recovery or as nominated in the laboratory's QC report, based on their historical database.
Method blanks	Less than the laboratory LOR.
Laboratory control samples	Recoveries between laboratories specified range for each particular analyte / analytical suite.

4.0 Sampling Location Rationale and Methodology

The OMP (Senversa, 2018c) is presented as **Appendix F** of the Robertson Barracks PMAP (Defence, 2019) and identifies the specific inputs required to meet Defence's long-term strategic goals in relation to the management of PFAS contamination at the Site.

The OMP (Senversa, 2018c) presents an overview of specific monitoring works to be undertaken and provides the basis for the preparation of this SAQP. This scope of works presented in this SAQP is consistent with that detailed in the OMP (Senversa, 2018c), with the exception of those points of deviation presented in Section 4.18.

4.1 Proposed Schedule

The key elements of the OMP (Senversa, 2018c) are bi-annual monitoring of groundwater and surface water locations, and annual monitoring of sediment. Bi-annual events are to occur at the end of wet season and end of dry season when groundwater and surface water conditions reflect seasonal influences. The annual sediment sampling is to occur in the Wet season when sediment is more likely to be present in drainage lines at Robertson barracks and generally more accessible.

Sample events should be conducted in the following periods:

- Q2 – end of wet season, March/April
- Q4 – end of dry season, September/October

A program schedule is presented in **Appendix A**.

4.2 Access requirements for sampling on Robertson Barracks

4.2.1 Access requirements for sampling on-Base

A range of access requirements exist to gain access to the appropriate areas for the collection of groundwater and surface water samples. Initiating contact with Robertson Barracks no less than two weeks prior to sampling is necessary to ensure all access requirements are satisfied and approved by Base Management as detailed in the Site OMP (Senversa, 2018c).

To gain access to Robertson Barracks each field team member must obtain baseline clearance from Defence and receive a Defence Common Access Card (DCAC), which allows unescorted entry to the base. Field team members without baseline clearance and DCAC's will need to be escorted by a field team member that has escort authority associated with their DCAC or have arranged an escort prior to sampling.

To conduct works on the base, Defence Estate and Infrastructure (E&IG) must be contacted to inform them of the intended works and to gain permission prior to carrying those out. As well as grant permission to conduct works, E&IG will alert the dedicated field team of any conflicting works on base. Photo permits must be obtained from E&IG upon arrival at the base, no photos are to be taken before this is done.

If sample locations occur in a construction site, the field team will need to get permission from the project manager to access the site. Any internal inductions for the site will also need to be completed by the team upon the project manager's request.

No. 2 Security Forces Squadron (2SECFOR) is the base security service and will need to be made aware of the works to be carried out and the locations that sampling will occur in.

4.3 Groundwater Sample Location Rationale

There are 18 monitoring wells identified for ongoing monitoring, including on-site and off-site locations (comprising of public land access). The OMP (Senversa, 2018c) will monitor groundwater source area concentration changes and changes that may occur at the Base boundary or off-Base locations, which could indicate a change in contaminant transport off-Base. The OMP (Senversa, 2018c) will also monitor water supply quality at two groundwater abstraction bores at the SBRS (outside of the Management Area) which are currently used for potable water by Defence.

Table 4 Groundwater Sample Rationale

Area	Rationale
Robertson Barracks	• Monitoring wells selected target the upper and lower portions of the Bathurst Island Formation • Monitoring wells are located at Source Areas 1, 2 or 3 where PFAS impacts have been identified, up and down gradient of these locations and/or on boundaries, or adjacent to potential surface water drainage features that discharge form the site.
Close Training Area	• Monitoring wells selected target the upper and lower portions of the Bathurst Island Formation. • PFAS impacts in groundwater are yet to have been identified in the CTA to date.
Southern Drainage Channel	• Monitoring wells selected target the upper portions of the Bathurst Island Formation only. • Monitoring wells located adjacent to the southern drainage channel provide an indication of the extent of potential PFAS migration from Robertson Barracks to adjacent land.
Shoal Bay Receiving Station	• Monitor water quality of two groundwater abstraction bores at the SBRS to the north of the Management Area from the Wildman Siltstone Formation, used by Defence to provide potable water.

4.4 Groundwater Sampling Locations

The groundwater sample locations to be monitored are presented in Table 5 below and on **Figure 2** in **Appendix B**.

Table 5 Groundwater Monitoring Locations

Area	Description	Sampling Location	Aquifer*	Sampling Frequency	Number of wells/bores
Robertson Barracks	Source Area 1	MW066	UBIF	Bi-annual (end-Wet season/ end-Dry season)	On-Base (16 locations)
	Up-gradient of Source Area 2	MW080	UBIF		
	Source Area 2	MW004	UBIF		
		MW004D	LBIF		
	Down gradient Source Area 2 and 3	MW001	UBIF		
	Up gradient Source Area 1	MW012	UBIF		
		MW012D	LBIF		
	Northeastern Boundary of site	MW034	UBIF		
Close Training Area	Thorngate Road – Northern Boundary	MW032	UBIF		
	Down gradient Source 1	MW023 (MW024 will be sampled if MW023 is found dry)	UBIF		
		MW021	UBIF		

Area	Description	Sampling Location	Aquifer*	Sampling Frequency	Number of wells/bores
	Across gradient Source	MW021D	LBIF		
	Down gradient Source 2	MW018 MW031	UBIF		
Shoal Bay Receiving Station	Abstraction bores	MW112 and MW113	WSF		
Southern Drainage Channel (Public Land)	Down gradient of Source Area 2 and 3	MW029 and MW030	UBIF	Bi-annual (end-Wet season/ end-Dry season)	Off-Base (2 locations)

UBIF: Upper Bathurst Island Formation
LBIF: Lower Bathurst Island Formation
WSF: Wildman Siltstone Formation

4.5 Surface Water and Sediment Sampling Location Rationale

There are 9 locations identified for surface water and sediment sample collection for ongoing monitoring, including on-site in stormwater drains and off-site locations down gradient of the Robertson Barracks at Milners Creek (within the CTA) and SDC (on public land) (Table 6).

Table 6 Surface Water and Sediment Sample Rationale

Area	Rationale
Robertson Barracks	• Monitoring to target key source area contributions to drainage system and spatial extent of recorded PFAS concentrations in previous sampling. • Monitoring other areas to target down gradient of main drainage lines.
Close Training Area	• Monitoring locations along Milners Creek either where PFAS impacts have been identified or down-gradient of such locations, including the northern drainage line leading into Milners Creek.
Southern Drainage Channel (Public Land)	• Monitoring location located downstream of surface water flow from southern boundary of Robertson Barracks, where PFAS impacts have been identified. Location also provides an indication of potential PFAS migration from Robertson into the southern tributary of Milners Creek.

4.6 Surface Water and Sediment Sampling Locations

The surface water and sediment monitoring locations have been selected to maintain consistency with the monitoring completed during the interim monitoring events and the investigation phases. Many of the locations have been previously sampled several times, and continued monitoring will provide additional data to assess temporal variability. Surface water and sediment sample locations are co-located and are detailed in Table 7 below and presented on **Figure 3** in **Appendix B**.

The locations are to be monitored biannually for surface water (Wet season and Dry season). Unlike surface water, sediment concentrations are not expected to change significantly between the Dry and Wet seasons, however distributions may be expected to change after high flow seasons. Annual monitoring will therefore occur in the Wet season when sediment is more likely to be present in drainage lines at Robertson barracks and generally more accessible.

It is noted that some locations may not have sufficient surface water to sample during the Dry season. Where that is the case such observations at these locations will be recorded. In order to obtain samples during the Wet season, the timing of biannual monitoring may be adjusted or complemented by additional sampling events for locations that are generally dry.

Consideration will also be given to sampling after flooding and/or heavy rainfall events including cyclones, which may mobilise impacts generated from overland flow from source areas. These shall nominally comprise rainfall events of 1 Exceedance per Year (EY) rainfall depth (120 mm) in 24 hours or greater. Sampling shall be undertaken as soon as practicable following the event, ideally within 72 hours.

Table 7 Surface Water and Sediment Sampling Locations

Area	Description	Sampling Location (Surface Water / Sediment)	Sampling Frequency	Number of sampling locations
Robertson Barracks	On-base drainage line, South east boundary	SW001 / SD001	Bi-annual (Surface Water) (end-Wet season/ end-Dry season) / Annual (Sediment) (end-Wet season)	On-Base (8 locations)
	On-base drainage line, South west boundary	SW007 / SD007		
	On-base drainage line, Central	SW023 / SD023, and SW028 / SD028		
	On-base drainage line, Eastern boundary	SW059 / SD059		
Close Training Area	Northern Drainage Line	SW123 / SD123		
	Milners Creek	SW086 / SD086 and, SW091 / SD091		
Southern Drainage Channel		SW075 / SD075		Off-Base (1 locations)

4.7 Sample Collection and Handling

4.7.1 Groundwater Sampling

The groundwater sampling methodology and schedule are presented in Table 8.

Table 8 Groundwater Sampling Methodology and Schedule

Item	Details	
Groundwater gauging	The depth to groundwater will be measured in each monitoring well prior to collection of groundwater samples. The water level probe shall be decontaminated between sampling locations using Liquinox® and PFAS-free water. Additionally, during the first event a gauging round of all locations will be conducted prior to groundwater sampling to enable groundwater contours to be developed. The depth to groundwater will also be measured at the time of sampling at each location. All gauging shall be completed within a 24-hour period.	
Sample Collection Methodology	<u>Groundwater Monitoring Wells</u> Groundwater samples will be collected from monitoring wells using no purge methodology with HydraSleeves™ which will be installed within the screened interval of the wells, with the weight sitting one metre above the bottom of the well and secured to the well casing using dedicated disposable string. The HydraSleeves™ will be installed for a minimum of 12 hours prior to sampling for the initial sampling round. Once sampling is completed, new HydraSleeves™ will be deployed in preparation for the next six-monthly sampling round. Abstraction Bores. A new pair of disposable nitrile gloves will be used by sampling personnel at each monitoring well, with gloves disposed of once sampling has been completed at each well. Bore water samples will be collected by placing the laboratory provided sample bottle beneath the tap outlet and the tap slowly opened to collect the “first flush” of water.	
QA/QC Samples to be Collected	Field QA/QC samples are to include intra-laboratory duplicate (Duplicate) and inter-laboratory duplicate (Triplicate) samples and rinsate samples. Duplicate and triplicate samples are to be collected at a minimum frequency of 1 in 10 PFAS primary samples. Rinsate samples are to be collected at a rate of one sample per day of sampling when non-dedicated equipment is used, by pouring laboratory supplied PFAS free deionised water over the decontaminated sampling equipment. Additional sample volume is required to be collected to enable the appropriate laboratory QAQC. For 1-10 primary samples an additional set of samples for a laboratory duplicate and set of samples for a matrix spike analysis must be taken at two separate sites. For 11-20 primary samples an additional set of samples must be taken at a separate site for another duplicate.	
Field Parameters	Temperature, electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP), pH and observations of water quality will be recorded for all samples.	
Sample Analysis	All primary samples will be submitted for PFAS extended (or ‘Full’) suite using the standard levels of detection.	
Sampling Schedule	As per Appendix A.	
Minimum Sampling Volumes	Bottle	Minimum Volume
	PFAS Bottle (Grey)	20mL

4.7.2 Surface Water Sampling

The surface water sampling methodology and schedule are presented in Table 9.

Table 9 Surface Water Sampling Methodology and Schedule

Item	Details
Sample Collection Methodology	Samples are to be collected, using a telescopic sampling pole with laboratory supplied bottle on the end, from approximately 0.5 m below the surface (if possible), with care to minimise collection of sediment or floating materials in the samples. The sampling pole will be stainless steel to ensure that it does not contain PFAS. At each location, a new, laboratory supplied container should be lowered into the water using a sampling pole, with the cap immediately applied once the container is full. A new pair of disposable nitrile gloves will be used by sampling personnel at each sampling site, with gloves disposed of once sampling has been completed at each site. Following sample collection, field parameters will be recorded in-situ by placing the water-meter probe in the surface water collection location
QA/QC Samples to be Collected	Field QA/QC samples are to include intra-laboratory duplicate (Duplicate) and inter-laboratory duplicate (Triplicate) samples and rinsate samples. Duplicate and triplicate samples are to be collected at a minimum frequency of 1 in 10 PFAS primary samples. Rinsate samples are to be collected at a rate of one sample per day of sampling when non-dedicated equipment is used by pouring laboratory supplied PFAS free deionised water over the decontaminated sampling equipment. Additional sample volume is required to be collected to enable the appropriate laboratory QAQC.
Field Parameters	Temperature, EC, DO, ORP, pH and observations of water quality will be recorded for all samples. Observations on the water body will also be recorded, such as size, flow rate and type of water body.
Sample Analysis	All primary samples will be submitted for PFAS extended suite using the standard levels of detection.
Sampling Schedule	As per Appendix A.

4.7.3 Sediment Sampling

The sediment sampling methodology and schedule are presented in Table 10.

Table 10 Sediment Sampling Methodology and Schedule

Item	Details
Sample Collection Methodology	Samples to be collected from the sediment/water interface (0.0 to 0.1 mbgl), where practicable. A grab sample will be collected utilising a laboratory-supplied HDPE-free soil jar lowered into the water body using a stainless-steel sampling pole and nitrile gloves. Sediment will be collected directly into the jars until sampling jar capacity is met. Jar lids will be secured immediately upon completion of filling each jar. Alternatively, a grab sample can be collected wearing fresh disposable nitrile gloves or using a hand trowel or shovel, decontaminated with laboratory supplied PFAS-free water and Liquinox® solution after each use.
QA/QC Samples to be Collected	Field QA/QC samples are to include intra-laboratory duplicate and inter-laboratory duplicate samples (i.e. splits), field blanks and rinsate samples.
Soil Logging	The sediment will be logged in accordance with the Unified Soil Classification System (USCS) and AS1726:2017.
Sample Analysis	All primary samples will be submitted for PFAS extended suite using the standard levels of detection.

Item	Details
Sampling Schedule	As per Appendix A.

4.7.4 Sample Handling and Transport to Laboratory

AECOM personnel will attempt to reduce heterogeneity in the sample media matrix by dividing the sample collected between primary and inter/intra-laboratory collection jars or bottles during sampling. All samples will be placed on ice in eskies immediately after sampling.

All samples will be kept, if possible, at approximately 4°C during transit to the laboratory. Samples will be transported directly to the laboratory for analytical testing under standard Chain of Custody (CoC) procedures. Primary and field QA/QC samples will be analysed by Australian Laboratory Services (ALS) (Sidney, NSW), a National Association of Testing Authorities (NATA) accredited laboratory. The inter-laboratory duplicate samples will be analysed by National Measurement Institute (NMI) (North Ryde, NSW), also a NATA accredited laboratory.

Prior to sampling, assessment of the analytical holding times will be made, and the sampling planned accordingly to ensure that holding times are not breached or minimised.

4.8 Calibration

The water quality meter will be calibrated prior to field mobilisation for field activities with relevant solutions, including pH, EC and ORP. The calibration will be in accordance with manufacturers' instructions or NATA publication "General Requirements for Registration: Supplementary Requirement: Chemical Testing (NATA 1993) and Technical Note No. 19 (NATA 1994)". Where satisfactory calibration cannot be achieved, the water quality data will not be used for interpretive purposes.

Calibration details will be recorded on a calibration record sheet and included in the Sampling Events Factual Reports.

4.9 Logistics

The laboratory sample containers will be shipped from the laboratory to the AECOM office in Darwin prior to the commencement of fieldwork. All primary samples will be transported by an ALS supplied courier at the completion of fieldwork. All inter-laboratory duplicate samples will be transported with the primary samples, then separated and couriered directly to the secondary laboratory (NMI, Sydney) by ALS under a separate CoC for analysis.

4.10 Analytical Suite and Laboratory Analysis Methods

4.10.1 Laboratory NATA Accreditation Details

Laboratory Sampling analysis is to be conducted using NATA certified laboratories which will implement a quality control plan in accordance with NEPM (2013).

4.10.2 Analytical schedule

All media sampled shall be analysed for the extended PFAS suite with standard LOR as outlined in Table 11 below.

Table 11 Sample Analytical Suite for PFAS

PFAS Group	Compound	CAS No.
Perfluoroalkyl Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	375-73-5
	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4
	Perfluoroheptane sulfonic acid (PFHpS)	375-92-8
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1

PFAS Group	Compound	CAS No.
	Perfluorodecane sulfonic acid (PFDS)	335-77-3
Perfluoroalkyl Carboxylic Acids	Perfluorobutanoic acid (PFBA)	375-22-4
	Perfluoropentanoic acid (PFPeA)	2706-90-3
	Perfluorohexanoic acid (PFHxA)	307-24-4
	Perfluoroheptanoic acid (PFHpA)	375-85-9
	Perfluorooctanoic acid (PFOA)	335-67-1
	Perfluorononanoic acid (PFNA)	375-95-1
	Perfluorodecanoic acid (PFDA)	335-76-2
	Perfluoroundecanoic acid (PFUnDA)	2058-94-8
	Perfluorododecanoic acid (PFDoDA)	307-55-1
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8
	Perfluorotetradecanoic acid (PFTeDA)	376-06-7
Perfluoroalkyl Sulfonamides	Perfluorooctane sulphonamide (FOSA)	754-91-6
	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

The current standard laboratory limits of reporting (LOR) are described in Table 12 below.

Table 12 Laboratory Limits of Reporting

Sample Media	Parameter	Technique/Method Reference	LOR
Groundwater and Surface Water	Extended PFAS Suite	LC/MS-MS	0.01 – 0.1 µg/L

LC/MS-MS = Liquid chromatography–mass spectrometry
LOR for Australian Laboratory Services (ALS)

4.11 Sample Nomenclature

In order to meet Defence data management requirements presented in **Section 4.0** of **Annex L** of the **Defence Contamination Management Manual** (**DCMM**) (Department of Defence, 2018) , a consistent sample nomenclature has been adopted for the program. All samples collected from each location should have a unique identification. The minimum mandatory requirements for the sample identifications are outlined in Table 13, further examples relevant to this SAQP are outlined in Table 14.

Table 13 Mandatory requirements for Defence sample nomenclature

Sample ID	Location ID
PPPP_XX000_ZZZ_YYMMDD	XX000
e.g. 1200_BH001_1.2_190207	e.g. BH001
Reference	
PPP – property identification (4-digits) XX – type of sample recovery 000 – location specific identification ZZZ – indicates the depth that the sample has been collected (in meters below ground level [bgl] YYMMDD – date of sample collection	

Table 14 Sample Abbreviations

Abbreviation	Meaning	Matrix	Examples of Methods of Sampling	Example Sample Name/Comments
MW	Monitoring Well	Water	Groundwater	1200_MW104_180630 Aquifer details can also be added following the location ID if required, where; P – perched, S – shallow, I – intermediate, and; D – deep
SW	Surface water	Water	Surface water	1200_SW002_180630

4.11.1 Quality Assurance / Quality Control Sample Nomenclature

The naming convention for QA/QC samples are outlined in Table 15 below.

Table 15 QA/QC sample naming convention

QA/QC Sample Type	Naming Convention (where XX is a sequential number independent of sample or matrix type)
Quality control duplicate samples	
Intra-laboratory duplicate (duplicate)	1200_QC1XX_YYMMDD
Inter-laboratory duplicate (triplicate)	1200_QC2XX_YYMMDD
Quality assurance samples	
Rinsate	1200_QC3XX_YYMMDD
Field Blank	1200_QC4XX_YYMMDD
Trip Blank	1200_QC5XX_YYMMDD

4.12 Defence ESdat Requirements

Defence has contracted Earth Science Information Systems (EScIS), to provide contamination data management services through a cloud instance of its ESdat product.

All OMP field and laboratory data collected by AECOM will be uploaded, stored and managed in Defence's ESdat database in accordance with Section 6 of Annex L to the Defence Contamination Management Manual. AECOM will refer to historical investigation data to ensure consistent location codes are used to enable analysis of data trends. Where required under Annex L, non-compliant location codes will be resolved under direction from Defence.

AECOM will upload the data from each monitoring event into ESdat prior to submitting the Sampling Event Factual Report.

4.13 Adopted Screening Criteria

PFAS screening values have been adopted for groundwater and surface water from the Defence OMP (Senversa, 2018c) and are derived from the following documents:

- HEPA (2020) PFAS National Environmental Management Plan 2.0 (NEMP)
- Department of Health (DoH), 2019. Health Based Guidance Values for PFAS for use in site investigations in Australia. September 2019 (DOH 2019)
- National Health and Medical Research Council (NHMRC), 2019. Guidance on PFAS in Recreational Water. August 2019 (NHMRC 2019)
- National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B1, as amended in 2013 (ASC NEPM)

Adopted PFAS screening values are provided in Table 16.

Table 16 Adopted PFAS screening values for all media (µg/L)

Pathway	Compound	Criteria	Comment / Reference
Drinking water - groundwater	PFHxS+PFOS	0.07 µg/L	The values presented in the PFAS NEMP 2020 (HEPA, 2020) are from DoH 2017, which published final health-based guidance values for PFAS for use in site investigations in Australia. DoH utilised the TDI for PFOS and PFOA from FSANZ, 2017 and the methodology described in Chapter 6.3.3 of the National Health and Medical Research Council's (NHMRC) Australian Drinking Water Guidelines (ADWG), 2016 to determine drinking water values. For PFHxS, DoH 2017 noted that '*FSANZ concluded that there was not enough toxicological and epidemiological information to justify establishing a tolerable daily intake. However, as a precaution, and for the purposes of site investigations, the PFOS tolerable daily intake should apply to PFHxS. In practice, this means that the level of PFHxS exposure should be added to the level of PFOS exposure; and this combined level be compared to the tolerable daily intake for PFOS*'. *All groundwater results will be compared to these criteria.*
	PFOA	0.56 µg/L	

Pathway	Compound	Criteria	Comment / Reference
Recreational use – surface water	PFHxS+PFOS	2 µg/L	The values presented in the PFAS NEMP 2020 (HEPA, 2020) were based on NHMRC guidance on the assessment of PFAS in surface water, released in 2019. Rather than adopting an ingestion rate of 0.2 L of water per day (as per the ADWG formula), NHMRC adjusted this rate with consideration of an event frequency (150 events / year) to calculate an annual ingestion rate of 30 L per year. *All surface water results will be compared to these criteria.*
	PFOA	10 µg/L	

Table 17 PFAS criteria summary: Ecological

Media	Pathway	Chemical	Criteria	Comment/Reference
Water	Freshwater	PFOS	0.00023 µg/L	HEPA (2020) NEMP 99% species protection
		PFOA	19 µg/L	

4.14 **Note: HEPA (2020) notes that the 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement. For the purposes of this plan, a 'detect' threshold has not been applied.** **Waste Management**

Due to the proposed "no purge" sampling methodology, it is not anticipated that significant volumes of liquid waste would be generated that would require management or disposal.

Single use sampling equipment and any waste generated during works (including generation of wastewater or soil) will be managed and/or disposed of appropriately in accordance with Territory waste disposal requirements.

4.15 Quality Assurance/Quality Control Sampling

The recommendations within this document are based on the guidelines presented in:

- NEPM [the National Environment Protection (Assessment of Site Contamination) Measure 1999] as amended in 2013.
- AS4482.1 Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-Volatile and Semi-Volatile Substances.
- AS4482.2 Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile Substances.
- AS/NZ 5667.1 Water Quality Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handing of samples.
- ANZECC&ARMCANZ (2000). Australian guidelines for water quality monitoring and reporting.
- ANZECC& ARMCANZ (2000). Australian and New Zealand guidelines for fresh and marine water quality.
- WA DER (2016). Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS).
- United States Environmental Protection Agency (US EPA) (2000) Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4.

4.15.1 Field Intra-laboratory Duplicate and Inter-laboratory Duplicate Samples

Intra-laboratory and inter-laboratory field duplicates will be collected at a frequency of one per ten samples for each environmental media that are collected (10%). Repeatability will be assessed by relative percentage difference (RPD) between primary and duplicate samples. If RPD has variability greater than 30% the sample will be reviewed. The minimum volume of duplicate and inter-duplicate samples are to follow the below requirements set by the primary and secondary laboratories.

4.15.2 Rinsate Samples

Rinsate samples will be prepared in the field using laboratory prepared bottles and PFAS free deionised water used for the cleaning of 'reusable sampling equipment' (if used). These will be collected at a frequency of one per day or for each 10 primary samples where more than ten samples are collected in a day, where reusable sampling equipment has been used.

4.15.3 Field Blank Samples

The Field Blank sample will be prepared in a clean environment (office or warehouse) and remain with the sample containers during sampling and during return to the lab.

4.15.4 Trip Blank Samples

The Trip Blank samples will be prepared in a clean environment (office or warehouse) and remain with the sample containers during sampling and during return to the lab.

4.15.5 Additional PFAS samples

Additional sample volumes will be obtained to enable laboratory QA/QC (duplicates and matrix spike) for PFAS analysis. The frequency of additional samples is 2:10 and 3:20, where two additional sets (2x20mL) are required per 10 primary samples, or three sets per 20 primary samples.

4.16 Fieldwork Documentation

4.16.1 Field Observations and Results

Field notes will be maintained to record all field sampling events and include observations made at each sample location. Field notes will include information specific to the sample media as follows:

- Groundwater Samples – comments on the observed characteristics of the sample (e.g. colour, turbidity, odour, sheen) and reported field water quality parameters (pH, EC, DO, ORP, temperature) will be recorded at regular intervals;
- Surface Water Samples – comments on the observed characteristics of the sample (e.g. colour, turbidity, odour, sheen), field water quality parameters (pH, EC, DO, ORP, temperature), and sampling location description (e.g. stream width, stream depth, flow direction) will be recorded; and
- Sediment Samples – comments on the observed characteristics of the sample (e.g. colour, turbidity, odour, sheen) and logged in accordance with the Unified Soil Classification System (USCS) and AS1726:2017

The geo-coordinates for each sample location will be noted. The location of quality control (e.g. duplicate and inter-laboratory duplicate) sample collection points will also be noted.

AECOM's tablet-based Environmental Data Collection and Analysis ('EDCA') tool will be utilized by field staff to capture consistent field data based on project specific requirements, minimise potential data transcription errors, allow on-the-spot identification of potentially erroneous data in comparison to historical data and facilitate efficient data transfer to multiple data systems including ESdat.

4.16.2 Sample Labels

Sample containers will be labelled, as a minimum, with the following information:

- AECOM project number;
- Name of sampler;
- Sample ID;

- Date of sample collection; and
- Filtered vs non-filtered (for water samples only).

An indelible felt pen will be used for labelling, to ensure that the lettering is not erased during transit to the laboratory.

AECOM will utilize the tablet based EDCA tool to streamline sample labelling and chain of custody (CoC) creation to ensure compliant sample IDs are used in the field.

4.16.3 Chain of Custody Forms

A CoC form will be completed, documenting the sample identification number and analytes. The CoC documents the chain of events from sample collection to delivery at the laboratory and provides a traceable account of sample handling. The CoC form will be signed by both the sample collector and the receiving laboratory.

The CoC form will include the following information:

- Job number (Note: the name of the site is not identified for confidentiality purposes);
- Date and time of sample collection;
- Sample ID;
- Type of containers;
- Name of sampler;
- Laboratory to be used;
- Analyses required;
- Any comments; and
- Signatures of the sampler and laboratory receiver.

In the event that additional samples are collected during the field investigations due to observations made by the field team, (i.e. samples not proposed in this SAQP), Defence will be provided the rationale for collection of those samples and proposed laboratory analyses. Defence approval will be sought to include these samples on the CoC and to dispatch these samples to the laboratory.

Upon receipt of the original documents accompanying the samples at the laboratory, the laboratory will provide a sample receipt document (noting the temperature of samples upon receipt, analyses required and any non-conformances) and return the signed CoC form to confirm analyses to be performed and the due date for the analytical results.

4.16.4 Sampling Documentation

Field sampling sheets will be completed for each location, and will include the following information (as appropriate for the media being sampled):

- Name of sampler;
- Sample location;
- Date /time of monitoring/ sampling;
- Sampling method;
- Observations of the sampled media; and
- Calibration records.

Records of all equipment calibration will be included in the Sampling Event Factual Reports.

4.17 Reporting

4.17.1 Sampling Event Factual Report

No later than four weeks following the completion of each sampling event, AECOM will prepare and submit a Sampling Event Factual Report to Defence. A sampling event is defined as all sampling activities occurring in association with a PMAP defined season (i.e. end of dry / start of wet season), which can include groundwater, surface water, and / or sediment sampling occurring at different times throughout a specified season as is appropriate for each sampling type. Each Sampling Event Factual Report will include:

- details of the scope of monitoring completed
- a description of the sampling methodologies used
- a summary of observations made while sampling (e.g. any visual or olfactory observations that may indicate impacts to surface water or groundwater)
- a 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
- a presentation of the analysis results in a table that includes comparisons with PFAS guidelines, highlighting any significant statistical deviations from historical monitoring and investigation data
- a presentation of the reduced groundwater levels for the event on a figure with inferred contours and inferred groundwater flow direction
- discussion of the analytical data quality, including review of the quality control sampling results and laboratory quality control data
- inclusion of the following information as attachments:
    - Figures
    - Tables
    - Sampling logs and forms including field water quality parameter measurements
    - Chain of custody forms
    - Laboratory analytical certificates and QAQC reports
    - Equipment calibration certificates

4.17.2 Annual Monitoring and Management Report

At the end of each 12-month monitoring period, AECOM will prepare and submit an Annual Interpretive Report to Defence. Each Interpretive Report will include:

- evidence of compliance with the requirements of the SAQP and meeting stated objectives of the OMP (Senversa, 2018c)
- 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 (Senversa, 2018c)
- assessment and commentary on appropriate QA/QC procedures
- a review of the Conceptual Site Model and provision of a revised Conceptual Site Model if required
- data interpretation, including trends in groundwater concentration, gradient and flow directions
- assessment of statistically based trends that may inform decision making when it comes to the revision of an OMP (Senversa, 2018c)

- 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.

4.17.3 OMP Review

Review of ongoing management at the site for the release to the government and public stakeholders. The report should contain the following information:

- Identification of improvements to the OMP procedures in light of observed variability or concentration changes
- Review of data gaps and nomination of measures to address significant gaps
- Review of Changes in Australian or international practice and guidance in PFAS investigation
- Reporting of changed conditions that require mitigation or warrant review of risk assessments

4.18 Deviations from OMP

While the scope of works and methodology described in this SAQP are generally consistent with that presented in the OMP (Senversa, 2018a), a number of points of deviation are noted (refer to Table 18 below).

Table 18 Deviations from OMP

No.	Description	Rationale
1	Adoption of Revised Recreational Screening Criteria for PFHxS+PFOS and PFOA	Following the release of the OMP (Senversa, 2018c) in July 2019, the National Health and Medical Research Council (NHMRC), published guidance on PFAS in Recreational Water. The adopted screening criteria for PFHxS+PFOS and PFOA in surface water have therefore been revised to 2 µg/L and 10 µg/L, respectively. This is reflected in **Section 4.13.**
2	Sampling of groundwater and surface water for the non-PFAS suite.	Defence notified the AECOM project management team via email on 27th January 2021 that "*all future OMP sampling events across all sites, the inclusion of non-PFAS analysis will need to be justified in advance and agreed by Defence Tech Policy through review of the SAQP*".
3	Inclusion of MW024 as a contingency well for MW023.	Monitoring location MW023 has been found dry during several monitoring events. MW024 is located downgradient of MW023 in an area more likely to have water availability during dry season sampling events and can serve as a downgradient sentinel well when MW023 cannot be sampled.
4	Well ID Changes: • ROBMW01 to MW034 • ROBMW07 to MW080 • 103MW02 to MW066 • SBRS1 (OSP002_Bore1) to MW112 • SBRS (OSP002_Bore 2) to MW113	The naming changes were conducted to ensure that the well IDs are DCMM compliant.

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Department of Environment and Natural Resources*, Waste Management and Pollution Control Act 1998* (NT)

Appendix A

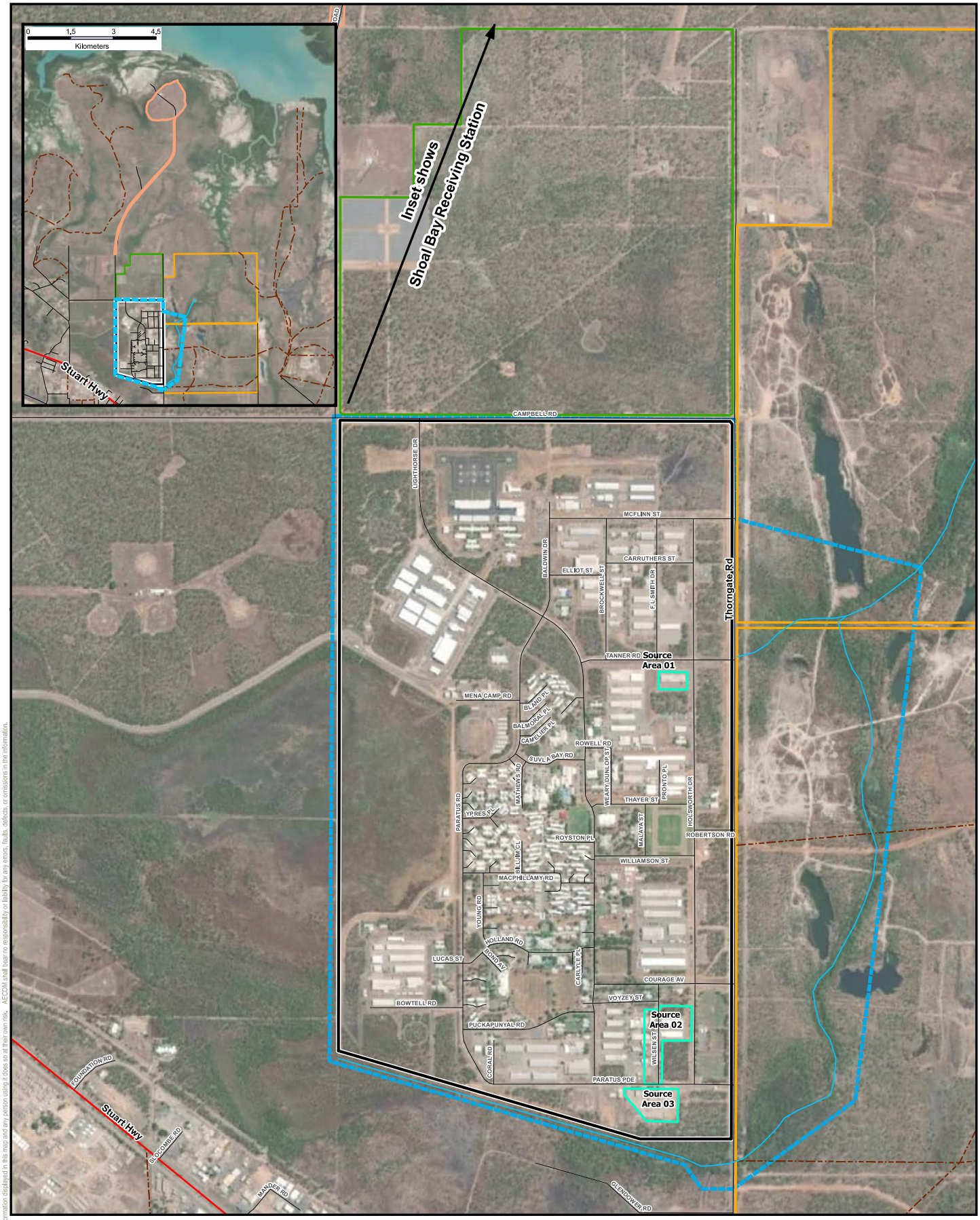
Schedule

D R A F T

			Wet Season					Dry Season						
			Q4/Q1			Q2		Early		Mid			Late	
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Robertson Barracks	Fieldwork	Groundwater				Biannual On-Base / Off-Base					Biannual On-Base / Off-Base			
		Surface Water	End of wet season Off-base / On-Base			End of wet season Off-Base / On-Base								End of wet season Off-base / On-Base
		Sediment				End of wet season Off-Base / On-Base								

Appendix B

Figures



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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500
metres

1:14,000 (when printed at A3)

LEGEND

- Monitoring
- Source

Site Layout

- Robertson Barracks
- Close Training
- Marksmanship Training Range
- SBRS Facility

- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

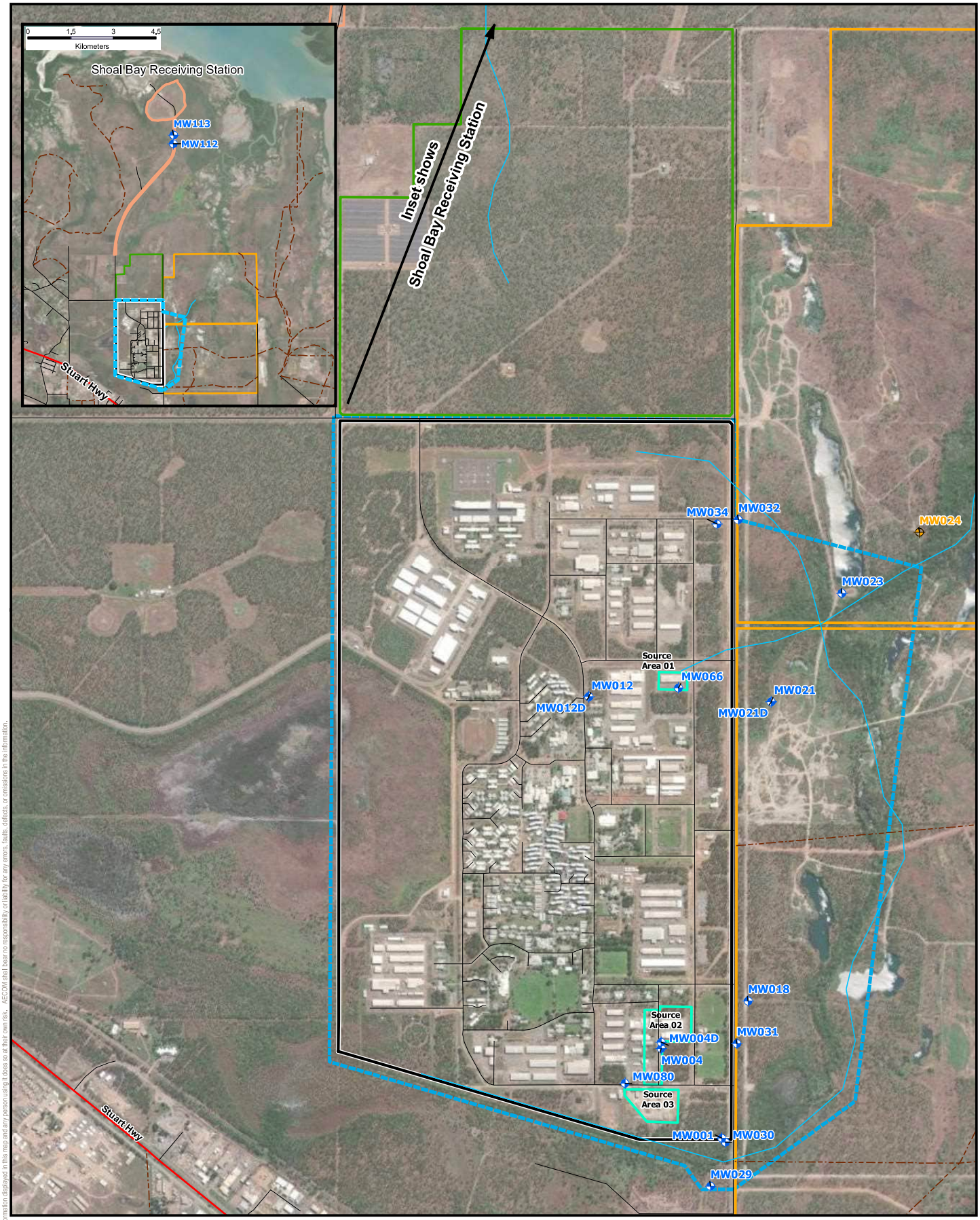
Department of Defence
Robertson Barracks
Sampling and Analysis Quality Plan 2021
PFAS Management Area

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted] 23 JUN 2021
VERSION:	1

Figure 1

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A3 size



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LEGEND

- Groundwater Monitoring Locations
- Contingency Locations
- Monitoring
- Source

Site Layout

- Robertson Barracks
- Close Training
- Marksmanship Training Range
- SBRS Facility
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence
Robertson Barracks
Sampling and Analysis Quality Plan 2021
On-Base and Off-Base Groundwater Monitoring Locations

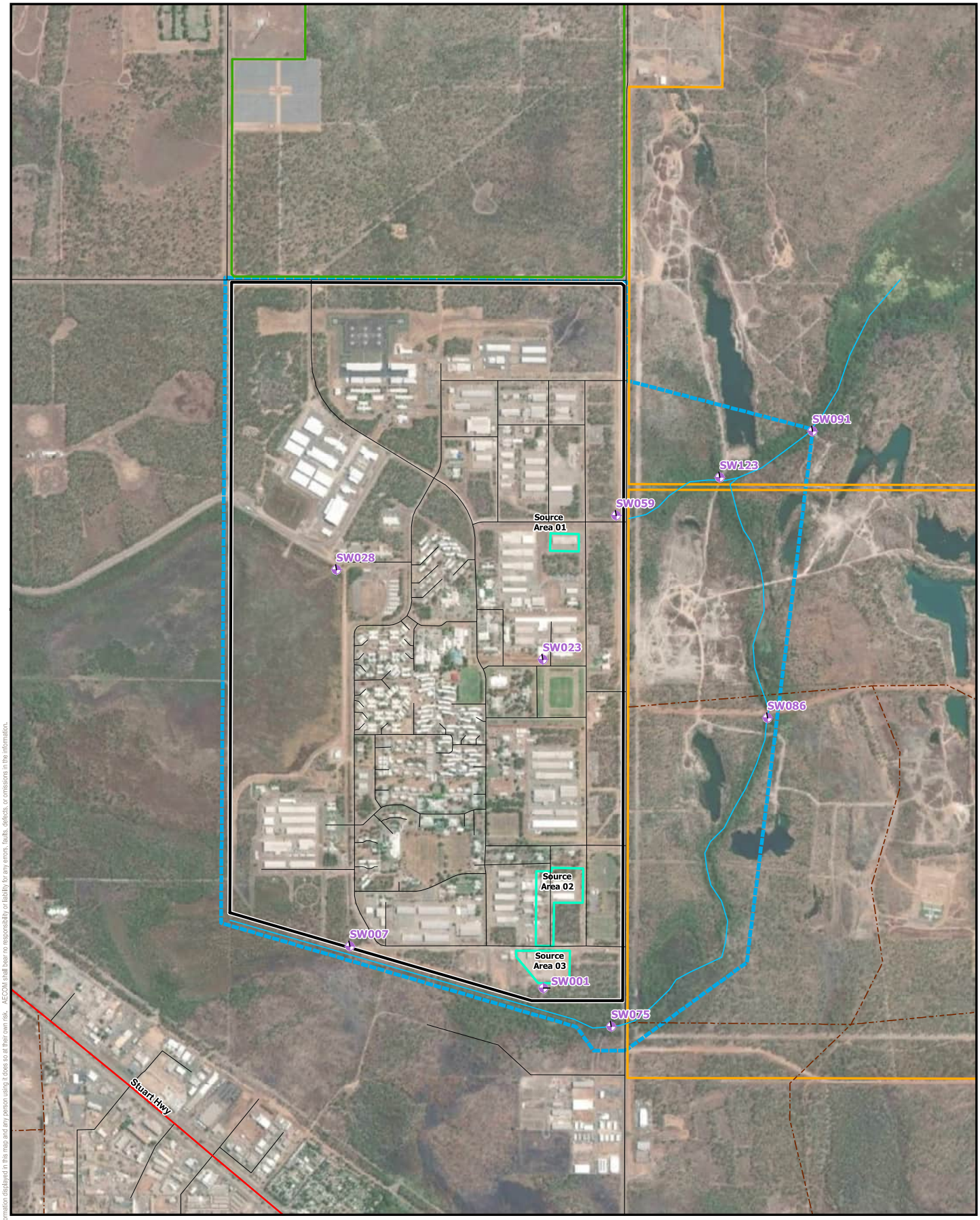
PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted] 27 OCT 2021
VERSION:	1

Figure 2

A3 size

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metres

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LEGEND

- Surface Water Locations
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence Robertson Barracks Sampling and Analysis Quality Plan 2021 On-Base and Off-Base Surface Water Monitoring Locations

PROJECT ID 60612561
CREATED BY [redacted]
LAST MODIFIED [redacted] 23 JUN 2021
VERSION: 1

Figure 3

A3 size

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Appendix C

Monitoring Location Tables

Table C-1 Robertson Barracks groundwater monitoring locations

Well ID	Legacy Well ID	Location	Target Aquifer	Well Cover Type	Easting	Northing	Top of Casing (mAHD)	Existing Surface (mAHD	Total Well Depth (mBTOC)	Total Well Depth (mBGL)	Casing Height (m)	Screen Level (mBGL)	Well Condition
MW066	103MW02	Robertson Barracks	Upper Bathurst Island Formation	Flush	715327.9	8624669.41	23.19	NK	12	12	0	1.5 to 12.0	Good
MW034	ROBMW01	Robertson Barracks	Upper Bathurst Island Formation	Stickup	715486.43	8625341.737	19.5	NK	12	12	0	1.0 to 12.0	Good - blockage reported at 6.1 mBTOC in May 2018
MW080	ROBMW07	Robertson Barracks	Upper Bathurst Island Formation	Stickup	715108.06	8623047.02	26.56	NK	17	17	0	2.5 to 17.0	Good
MW001		Robertson Barracks	Upper Bathurst Island Formation	Stickup	715505.57	8622822.33	24.37	23.71	7.05	7.05	0.66	1.5 to 7.5	Good
MW004		Robertson Barracks	Upper Bathurst Island Formation	Stickup	715256.6	8623189.56	26.78	26.05	8	8	0.73	2.0 to 8.0	Good
MW004D		Robertson Barracks	Lower Bathurst Island Formation	Stickup	715256.78	8626187.99	26.78	26.05	30.07	30.07	0.73	27.0 to 30.0	Good
MW012		Robertson Barracks	Upper Bathurst Island Formation	Stickup	714958.53	8624633.44	30.65	30.06	10.08	10.08	0.59	2.0 to 10.0	Good
MW012D		Robertson Barracks	Lower Bathurst Island Formation	Stickup	714959.9	8624632.46	30.77	30.06	30.19	30.19	0.71	27.0 to 30.0	Good
MW018		CTA	Upper Bathurst Island Formation	Stickup	715613.47	8623385.67	25.57	24.9	8.04	8.04	0.67	2.0 to 8.0	Good
MW021		CTA	Upper Bathurst Island Formation	Stickup	715707.15	8624613.08	18.03	17.3	7.99	7.99	0.73	2.0 to 8.0	Good
MW021D		CTA	Lower Bathurst Island Formation	Stickup	715707.09	8624611.41	17.99	17.3	30.13	30.13	0.69	27.0 to 30.0	Good
MW023		CTA	Upper Bathurst Island Formation	Stickup	715998.31	8625057.75	12.16	11.5	6.09	6.09	0.66	2.0 to 6.0	Good
MW024 Alternate for MW023 if dry		CTA	Upper Bathurst Island Formation	Stickup	716315.87	8625307.30	6.34	5.68	8.760	8.100	0.660	2.0 to 8.0	Good
MW029		Southern drainage channel	Upper Bathurst Island Formation	Stickup	715459.14	8622625.725	25.436	24.732	5.31	5.31	0.704	1.5 to 7.5	Good
MW030		Southern drainage channel	Upper Bathurst Island Formation	Stickup	715519.142	8622806.908	23.33	23.997	8.17	8.17	-0.667	1.5 to 7.5	Good
MW031		CTA	Upper Bathurst Island Formation	Stickup	715567.947	8623210.939	25.558	24.895	7.96	7.96	0.663	1.5 to 7.5	Good
MW032		CTA	Upper Bathurst Island Formation	Stickup	715572.273	8625358.983	19.862	19.173	8.14	8.14	0.689	2.0 to 8.0	Good
MW112	SBRS1 (OSP002_Bore1)	SBRS	Wildman Siltstone Formation	Bore tap	715965.27	8631539.21	NK	NK	NK	NK	NK	NK*	Good
MW113	SBRS (OSP002_Bore 2)	SBRS	Wildman Siltstone Formation	Bore tap	715966.18	8631539.2	NK	NK	NK	NK	NK	NK*	Good

NK – Not Known
* Publicly available records indicate one bore was installed with a screen interval between 36.8 and 50.5 mbgl with another screened between 48.0 and 57.0 mbgl

Table C-1 Robertson Barracks surface water and sediment monitoring locations

Surface Water Location ID	Sediment Location ID	Location	Area	Eastings (MGA)	Northings (MGA)
SW001	SD001	Robertson Barracks	Southeast	715217.25	8622868.93
SW007	SD007	Robertson Barracks	Southwest	714423.5	8623039.32
SW023	SD023	Robertson Barracks	Central	715215.13	8624216.19
SW028	SD028	Robertson Barracks	Central	714368.42	8624585.32
SW059	SD059	Robertson Barracks	Eastern boundary	715516.28	8624807.52
SW075	SD075	SDC	South of site	715496.6473	8622710.176
SW086	SW086	CTA	East of RB	716137.44	8623977.7
SW091	SD091	CTA	East of RB	716322.07	8625153.71
SW123	SD123	CTA	East of RB	715941.22	8624964.44

Prepared for
Department of Defence Directorate of PFAS Remediation Environment and Engineering Branch
ABN: 68706814312

AECOM

Sampling Event Factual Report, November 2021

PFAS OMP - Robertson Barracks

27-May-2022
Robertson Barracks
Doc No. 20200323_OMP001

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Sampling Event Factual Report, November 2021

PFAS OMP - Robertson Barracks

Client: Department of Defence Directorate of PFAS Remediation Environment and Engineering Branch

ABN: 68706814312

Prepared by

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27-May-2022

Job No.: 60612561

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Quality Information

Document	Sampling Event Factual Report, November 2021
Ref	60612561_1200_ROB_2021 Factual Report_Rev0_20220527.docx
Date	27-May-2022
Prepared by	[redacted]
Reviewed by	[redacted]

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	27-May-2022	Final	[redacted] Project Manager	[redacted]

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Abbreviations

Term	Description
AECOM	AECOM Australia Pty Ltd
ALS	ALS Environmental Pty Ltd
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
DCMM	Defence Contamination Management Manual
DIA	Darwin International Airport
DO	Dissolved oxygen
DoH	Department of Health
EC	Electrical conductivity
FSANZ	Food Standards Australia and New Zealand
HEPA	Heads of Environmental Protection Agencies
LOR	Limit of reporting
mAHD	metres Australian Height Datum
mbtoc	metres below top of casing
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan
NEPC	National Environment Protection Council
NHMRC	National Health and Medical Research Council
NMI	National Measurement Institute
NT	Northern Territory
NTU	Nephelometric Turbidity Unit
NSW	New South Wales
OMP	Ongoing Monitoring Program
ORP	Oxidation-reduction potential
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
QA/QC	Quality Assurance/Quality Control
QLD	Queensland
RAN	Royal Australian Navy
SAQP	Sampling Analysis Quality Plan
SWL	Standing Water Level

1.0 Introduction

1.1 General

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Program (OMP) outlined in the *PFAS Management Area Plan (PMAP)* (Department of Defence 2021) at Robertson Barracks (the 'Site') in the Northern Territory. The location of the Site and Management Area is shown in **Figure 1** in **Appendix A**. The OMP (Department of Defence 2021) for the Site outlines the requirement to complete annual sediment sampling and biannual groundwater and surface water sampling.

The primary purpose of the OMP program is to monitor changes to the PFAS impact in groundwater and surface water pathways associated with sources of PFAS as initially assessed through the detailed site investigation phase of works. Changes may result from the specific or cumulative impact of remediation or containment actions, existing transportation trends, and changes to hydrogeology or weather events.

The monitoring program at Robertson Barracks includes a regime of groundwater, surface water and sediment sampling to capture these changes in the long term, to enable Defence to maintain an up-to-date understanding of temporal and spatial distribution, concentration and transport of PFAS contaminants.

This report details the scope and findings of late-dry season monitoring activities including groundwater monitoring conducted in November 2021.

1.2 Objectives

As noted above, the objective of the PFAS OMP is to provide information on changes to PFAS contamination originating from Defence property to inform risk management decisions by Defence to protect human health and the environment.

The purpose of this PFAS OMP factual report is to summarise the scope of works and findings for the November 2021 groundwater sampling event, conducted in accordance with the Sampling and Analysis Quality Plan (SAQP) (AECOM 2021).

This report has been prepared in accordance with the *Defence PFAS OMP factual reports – interim guidance for preparation,* v0.2, May 2021 (Department of Defence 2021).

An annual interpretive report will be subsequently developed for the purpose of assessing the data collected during the discrete monitoring events completed over the preceding 12-month period and will include assessment of environmental variability and any statistically significant trends in PFAS concentrations.

2.0 Scope of work

The sampling event was completed in general accordance with the SAQP (AECOM 2021).

Prior to commencement of the sampling events, the SAQP (AECOM 2021), was reviewed to ensure compliance with the following:

- The OMP (Department of Defence 2021)
- PFAS National Environmental Management Plan (NEMP) (HEPA 2020)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM n.d.)
- Defence Routine Environment Water Quality Monitoring Manual (Department of Defence 2019a)
- AS/NZ 5667:1998 Water quality – Sampling (AS/NZS 1998)
- Water Quality Guidelines (ANZG 2018); and
- Relevant Territory regulatory guidelines.

In summary, the scope of works for this sampling event, conducted in November 2021, included:

- Collection of 18 groundwater samples (including gauging of groundwater levels, where appropriate) from existing monitoring wells using Hydrasleeves™ (refer to **Table 1** below, and **Figure 1** in **Appendix A**, for specific locations).
- Collection of intra- and inter-laboratory duplicate samples at a rate of 1 in 10 primary samples, one rinsate and one field blank sample per fieldwork day for groundwater and surface water.
- Analysis of all samples for a suite of 28 PFAS analytes at the standard limit of reporting (LOR).
- Data management of the OMP field and laboratory data in the Defence ESdat database
- Preparation of this Sampling Event Factual Report.

2.1 Planned monitoring locations

The monitoring locations outlined within the SAQP (AECOM 2021) for the OMP groundwater sampling event are tabled below:

Table 1 Groundwater sampling locations

Area	Description	Sampling Locations	Number of wells/ bores	Total
On Site	North Eastern Boundary of site	MW034	1	8
	Source Area 1	MW066	1	
	Source Area 2	MW004, MW004D	2	
	Up gradient Source Area 1	MW012, MW012D	2	
	Up gradient Source Area 2	MW080	1	
	Down gradient Source Area 1 and 2	MW001	1	
Off Site	Thorngate Road – Northern Boundary	MW032	1	10
	Down gradient Source 1	MW023*	1	

Area	Description	Sampling Locations	Number of wells/ bores	Total
	Across gradient Source	MW021, MW021D	2	
	Down gradient Source 2	MW018, MW031	2	
	Down gradient of Source Area 2 and 3	MW029, MW030	2	
	Shoal Bay Receiving Station (SBRS) Abstraction bores	MW112, MW113	2	

* Contingency location MW024 sampled in lieu

2.2 Deviations from the SAQP

The works completed during this sampling included no deviations from the SAQP (AECOM 2021).

3.0 Sampling methodology

The methodology adopted for the biannual groundwater sampling event in November 2021 was in accordance with the SAQP (AECOM 2021) and is summarised below:

Table 2 Sampling methodology

Item	Details
Groundwater and surface water sampling methodology	
Groundwater gauging	Where accessible, the depth to groundwater was measured in each monitoring well within a 24-hour period, and then again immediately prior to collection of groundwater samples using an interface probe.
Field parameters	Groundwater field parameters were recorded ex-situ, using a YSI Pro Water Quality Meter. Parameters recorded consisted of the following: temperature (°C), electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP) and pH. Observations of odour, colour and clarity (turbidity) of groundwater was recorded at each site.
Water sampling methodology	Groundwater samples were collected from all accessible wells using no-purge methodology HydraSleeves™, which were installed within the screened interval of the wells for a minimum of 24 hours prior to sampling. HydraSleeve™ placement was based on a review of the well construction logs. Once sampling was completed, new HydraSleeves™ were redeployed within the screened interval in preparation for the next sampling round. Two wells were sampled using the installed pumps by collection of a grab sample from the taps.
QAQC samples	Field QA/QC samples collected included intra-laboratory duplicate and inter-laboratory duplicate samples and rinsate samples. Refer to **Appendix D** for assessment of QAQC sample data.
Sample analysis	Samples were submitted to the primary and secondary laboratories for analysis. ALS Environmental (ALS) Sydney, NSW was used as the primary laboratory. The National Measurement Institute (NMI) of Sydney, NSW was used as the secondary laboratory. ALS and NMI methods for analyses were certified by the National Association of Testing Authorities (NATA). Laboratory certificates are presented in **Appendix F**

3.1 Adopted Screening Criteria

Screening criteria were selected on the basis of national guidance in the form of the PFAS National Environmental Management Plan, Defence estate and environmental strategies, and Defence PFAS-specific strategies and guidance. Guidance documents used to assess the dataset includes the following:

- Department of Health (DoH) Health Based Guidance Values for PFAS for use in site investigations in Australia (Department of Health 2019).
- Heads of the Environment Protection Authority (HEPA), PFAS National Environmental Management Plan (NEMP) (HEPA 2020).
- National Health and Medical Research Council (NHMRC), Guidance on PFAS in Recreational Water (NHMRC 2019).

The adopted screening criteria which have been adopted for groundwater and surface water are presented **Table 3**.

Table 3 Summary of adopted screening criteria for groundwater and surface water.

Pathway	Compound	Criteria	Comment/Reference
Human health receptors			
Drinking water - groundwater	PFOS + PFHxS	0.07 µg/L	These values are from the PFAS NEMP (HEPA 2020). All surface water and groundwater results will be compared to these criteria.
	PFOA	0.56 µg/L	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	These values are from Guidance on PFAS in Recreational Water (NHMRC 2019). All surface water results will be compared to these criteria.
	PFOA	10 µg/L	
Ecological receptors			
Freshwater (99% species protection values)	PFOS PFOA	0.00023 µg/L 19 µg/L	These values are from the PFAS NEMP (HEPA 2020). The 99% level of protection has been applied for slightly to moderately disturbed ecosystems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. For the purposes of preliminary screening of analytical water results, the laboratory LOR will be adopted rather than sole use of the criteria value. *All surface water and groundwater results will be compared to these criteria.*

3.2 Data quality objectives and data validation

The data quality objectives (DQOs) and data quality indicators (DQIs) adopted for these works are presented in the SAQP (AECOM 2021).

Data validation assessment is provided in **Appendix E**.

Key findings from the data validation were as follows:

- The potential exists for concentrations of PFOS to be below the LOR, but above the adopted guideline and this should be taken into consideration when interpreting results for groundwater.

Data validation procedures employed in the assessment of the field and laboratory QA/QC data are indicative that the overall quality of the analytical data produced is acceptably reliable for the purpose of this report. An examination of sampling analysis data compared to the data validation findings did not result in any results that required flagging for potential inaccuracies.

All data collected during this event has been reviewed and uploaded to the Defence ESdat database in accordance with Defence Contamination Management Manual (DCMM) (Department of Defence 2019b) Annex L requirements.

4.0 Field observations and results

4.1 General field observations

Field data was collected electronically on tablets and uploaded into ESdat for development of report tables. Field data tables are presented in **Appendix B.** The following field observations were applicable across the entirety of the November 2021 sampling event.

Table 4 General field observations

Item	Observation
Weather conditions	Weather in general was observed to be partly cloudy, 24.7-34.7 °C and moderate to high humidity during the sampling event. Rainfall was recorded at the nearest rain gauging station (Darwin airport) on 2 and 3 November; 14.4mm and 0.2mm respectively. (Darwin airport weather station, 014015) (Bureau of Meteorology 2021).
Estate Management Works or Training Activities	During the sampling event, no notable estate works, or training activities were observed in the vicinity of sampling locations.

4.2 Groundwater

4.2.1 Field observations and field measurements

Table 5 Groundwater observations and field measurements

Item	Observations and field measurements
Fieldwork Dates	The groundwater sampling was completed between 2 and 3 November 2021.
Access and Sample Collection	All monitoring wells and bores were accessible and sampled with the exception of MW023 which was dry; its contingency location MW024 was sampled instead. Wells MW112 and MW113 were sampled from the fitted taps.
Monitoring Well Network Condition	The monitoring well network was generally in good condition and unchanged from the previous round.
Field Observations	Root impaction was noted at monitoring well MW004 and roots on probe tips observed on MW012 and MW029. High turbidity was observed in samples collected from monitoring locations MW004, MW024, MW029, MW030 and MW031. HydraSleeves™ collected from monitoring locations MW001, MW004, and MW023 contained red sediment and sediment build-up was observed at the bottoms of wells during depth to bottom measurements.
Depth to Groundwater and flow direction	Depth to groundwater was recorded from 16 of 18 wells visited (all other than the two wells sampled via taps), ranging from 2.49 (MW030) to 8.438 (MW012D) metres below top of casing (m btoc). Groundwater elevations in the shallow aquifer, where calculated were between 2.92 (MW024) and 24.49 (MW012) metres Australian Height Datum (m AHD). Groundwater gauging data is presented in **Table B1** in **Appendix B**. Inferred groundwater contours and groundwater flow directions at the site in November 2021 are shown on **Figure 2** in **Appendix A**. Inferred groundwater contouring suggests that groundwater in the shallow aquifer unit drains east and northeast towards Millner's Creek.

Item	Observations and field measurements
Geochemical Parameters	Groundwater geochemical parameters were measured during sample collection from the HydraSleeve™ (or from the grab samples obtained from the taps) using a decontaminated YSI cup and YSI Pro Water Quality Meter. The readings are presented in **Table B1** in **Appendix B**, and are summarised below: • DO ranged from 0.44 mg/L (MW004) to 2.28 mg/L (MW021). • EC ranged from 36.9 µS/cm (MW012) to 1902 µS/cm (MW024) indicating a relatively low salinity. • pH ranged from 3.7 (MW031) to 5.9 (MW112 and MW113) indicating acidic conditions. • ORP (corrected) ranged from 145 mV (MW004D) to 420.9 mV (MW018) indicating oxidising to reducing conditions. It should be noted that the YSI water quality meter was calibration checked only once during this field event. However, all readings are within the predicted range.

4.2.2 PFAS groundwater analytical results

During this sampling event, 7 of the 18 groundwater locations sampled reported concentrations of PFAS above the laboratory limits of reporting (LOR).

There were no first-time exceedances at any groundwater monitoring locations.

The PFAS groundwater analytical results from the November 2021 sampling event are presented below (**Table 6**), in **Table B2** in **Appendix B** and spatially on **Figure 3** in **Appendix A.**

Table 6 First time detections of PFAS and exceedances of guidelines in groundwater

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		November 2021	Historical maximum	November 2021	Historical maximum	November 2021	Historical maximum
First time detections of Sum of PFHxS+PFOS, PFOS or PFOA in groundwater.	There were no first-time detections of PFHxS+PFOS, PFOS or PFOA during this sampling event.						
First time exceedance of human health criteria for sum of PFHxS+PFOS or PFOA in groundwater (shaded yellow).	There were no first-time exceedances of human health criteria in groundwater during this sampling event.						
First time exceedance of ecological criteria for PFOS or PFOA in groundwater	There were no first-time exceedances of ecological criteria in groundwater during this sampling event.						

5.0 Summary and Next Sampling Events

5.1 Summary of Monitoring Event

The annual and bi-annual monitoring event was completed at the Site and publicly accessible land within the Management Area between 2 and 3 November 2021. All groundwater monitoring wells were sampled, one of which was a contingency well.

The findings of the November 2021 sampling events and the recommended actions are summarised in **Table 7** below.

Table 7 Summary of Sampling Event

Item	Comment	Recommended Actions
Access to sampling locations	Monitoring well MW023 was dry during this event.	No actions required; contingency utilized.
Monitoring well network condition	The flush mount cover of monitoring well MW066 remains damaged with the cover cracked in half. The monitoring well J-cap is present, in good condition and appears to be preventing surface water from mixing with groundwater.	No actions recommended.
Analytical Results	PFAS concentrations were recorded above the LOR at 7 of 18 monitoring well locations sampled.	No actions recommended. Ongoing monitoring in accordance with the OMP.
First time exceedance of NEMP drinking water guideline values in groundwater	No first-time exceedance of the NEMP drinking water guideline for Sum of PFHxS + PFOS during the November 2021 sampling event.	Ongoing monitoring in accordance with the OMP.
First time detection of PFAS in groundwater	There were no first-time detections of PFAS values in groundwater during the November 2021 sampling event.	Ongoing monitoring in accordance with the OMP.
First time exceedance of NEMP drinking water guideline at abstraction bores at SBRS Facility	There were no first-time exceedances of PFAS values in groundwater collected from abstraction bores from the SBRS facility during the November 2021 sampling event.	Ongoing monitoring in accordance with the OMP.

5.2 Upcoming Sampling Events

Wet season surface water sampling will take place when the first significant rains are recorded at Robertson Barracks, and then again in March/April 2022. The next groundwater and sediment sampling event is scheduled for April 2022.

5.3 Upcoming Annual Interpretive Report

The third annual interpretive report is scheduled to be delivered in June 2022.

6.0 References

AECOM, 2021. *Sampling Analysis and Quality Plan - Robertson Barracks,* s.l.: s.n.

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AS/NZS, 1998. *Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples,* s.l.: s.n.

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Bureau of Meteorology, 2021. *http://www.bom.gov.au/jsp/ncc/cdio/weatherData.* [Online]
Available at: http://www.bom.gov.au/jsp/ncc/cdio/weatherData

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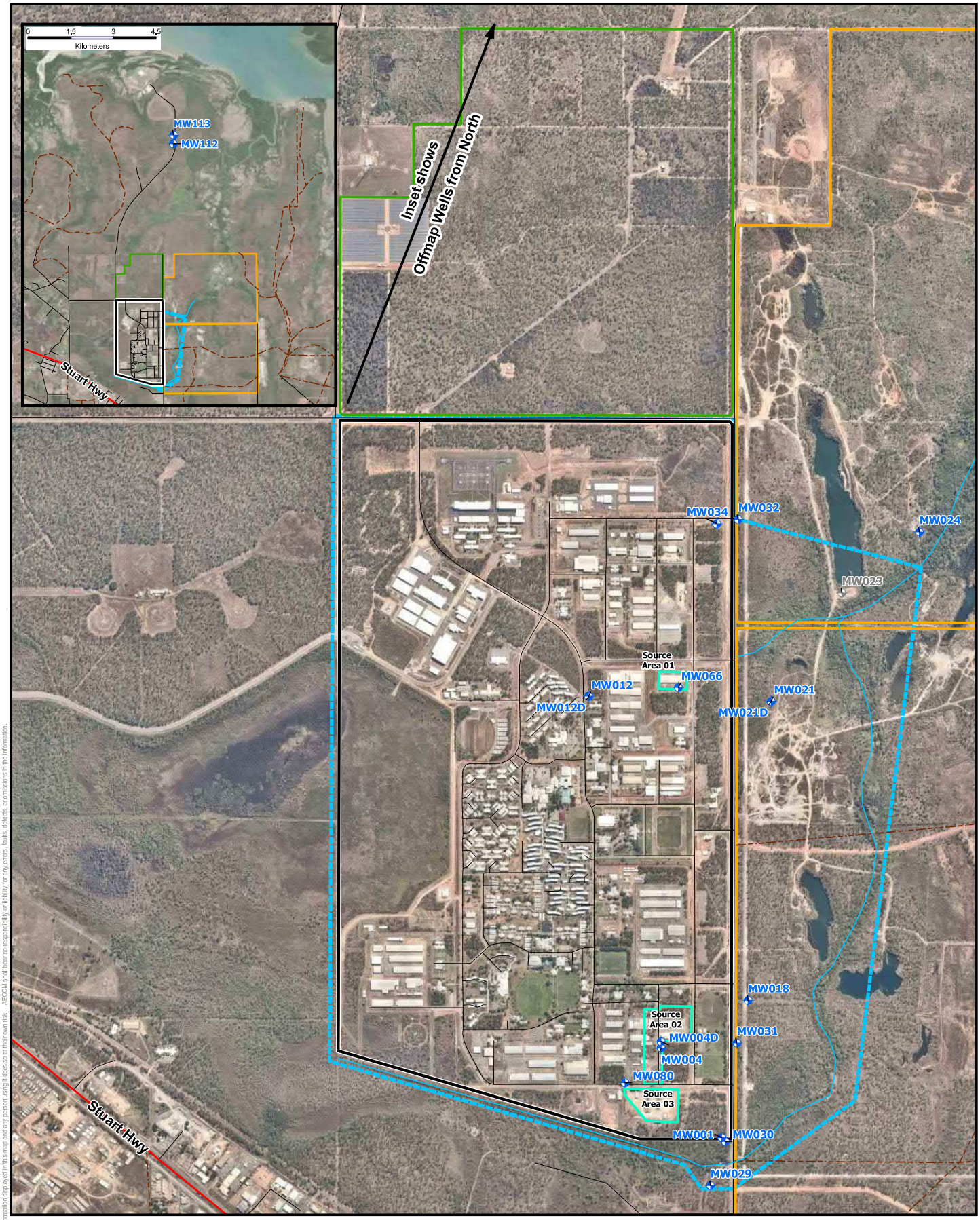
HEPA, 2020. *PFAS National Environmental Management Plan,* s.l.: s.n.

NHMRC, 2019. *Guidance on Per and Polyfluoroalkyl (PFAS) in Recrational Water,* s.l.: National Health and Medical Research Council.

Appendix A

Figures

Appendix A Figures



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500
metres

1:14,000 (when printed at A3)

LEGEND

- Groundwater Monitoring Locations
- Groundwater Monitoring Locations - Dry
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2021
GW data AECOM 2021
Aerial Nearmap 2021

Department of Defence

Robertson Barracks Groundwater Sampling Locations

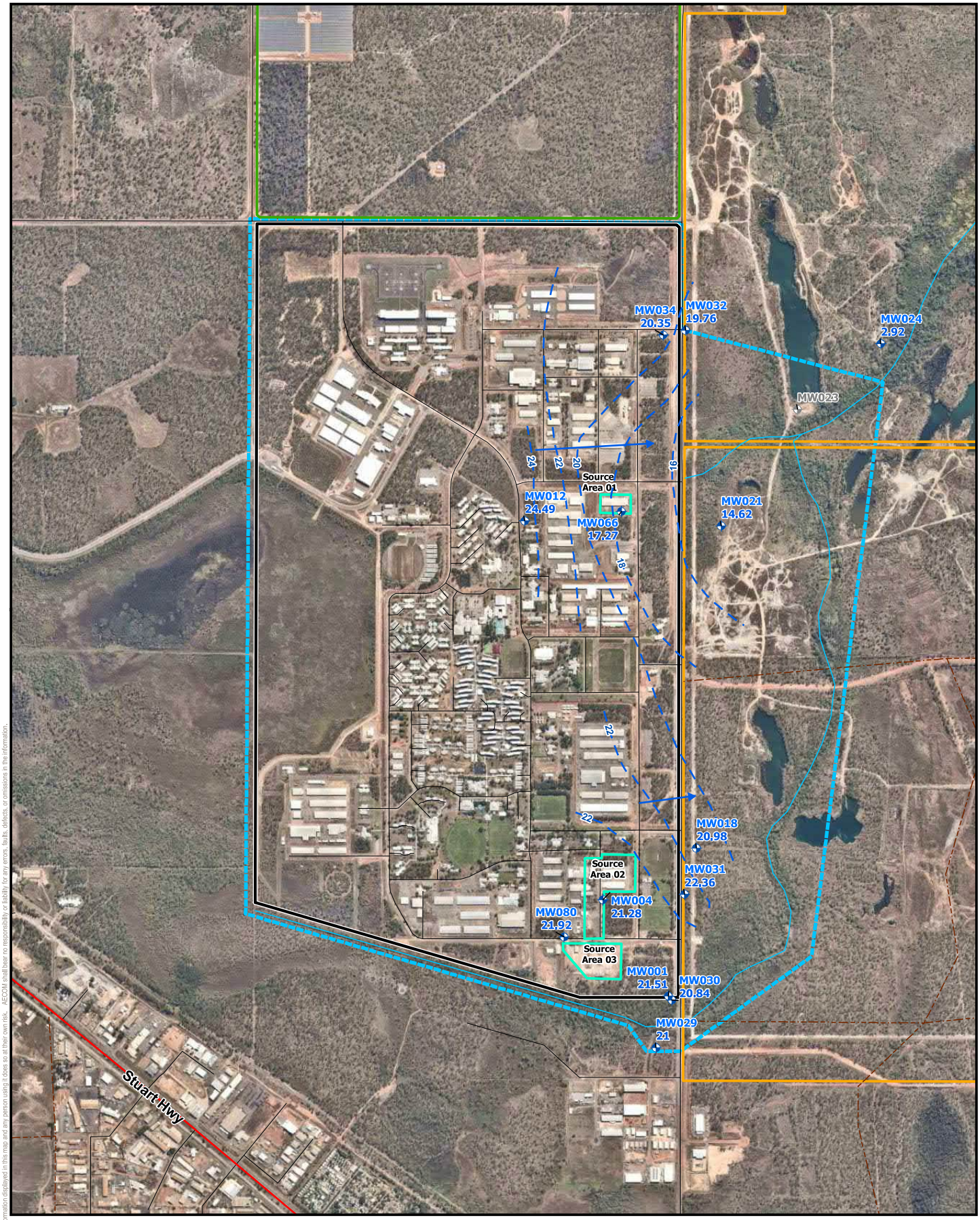
November 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	FLETTN
LAST MODIFIED	FLETTN - 21 DEC 2021
VERSION:	1

Figure 1

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A3 size



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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:13,000 (when printed at A3)

LEGEND

- Groundwater Monitoring Locations
- Groundwater Monitoring Locations - Dry
- Inferred Groundwater Level
- Inferred Flow Direction
- 175.44 Inferred Groundwater Level (mAHD)
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Department of Defence

Robertson Barracks
Inferred Groundwater Contours

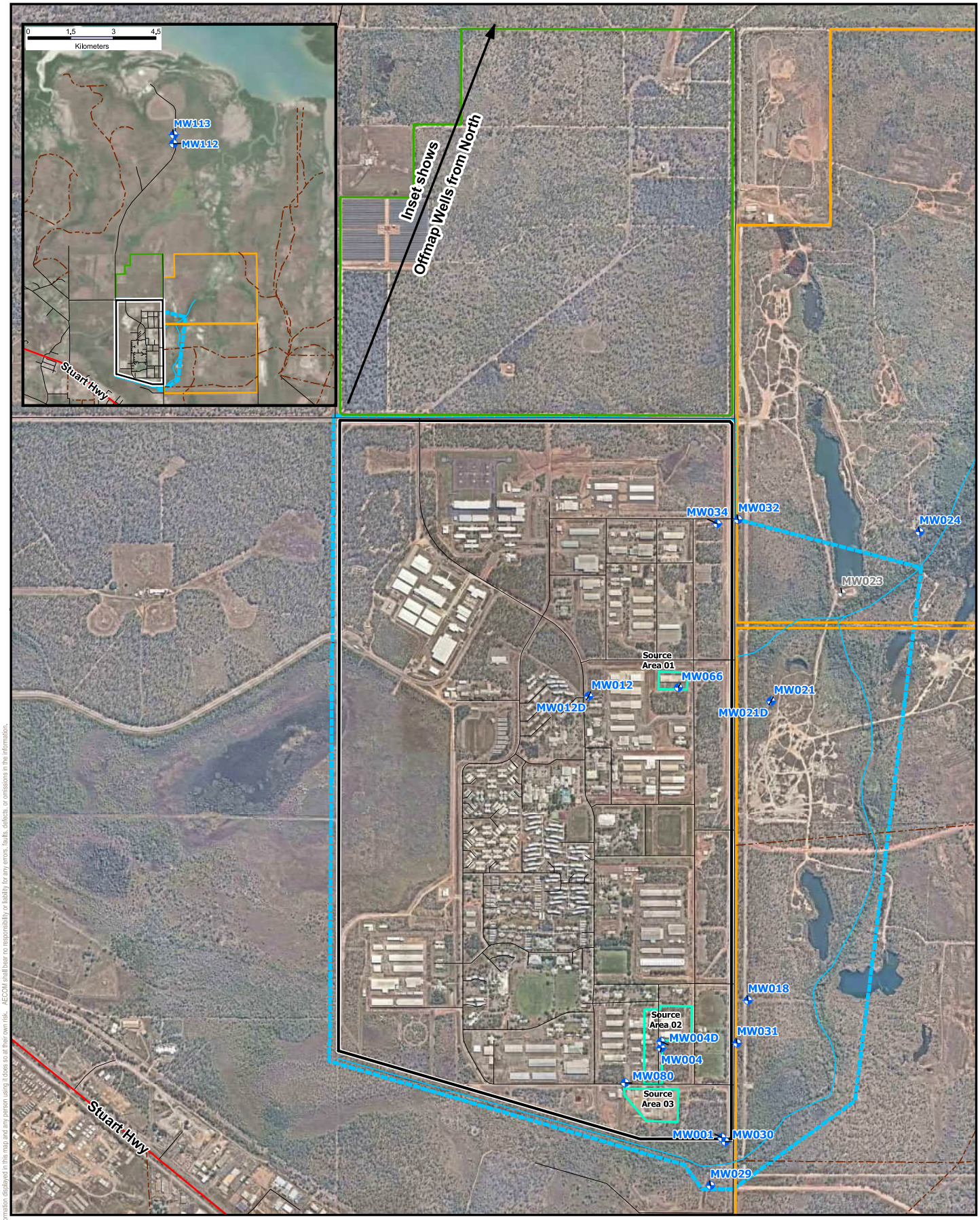
November 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	FLETTN
LAST MODIFIED	FLETTN - 22 DEC 2021
VERSION:	1

Figure 2

Filename: \\na.aecomnet.com\fs\APAC\Darwin-AUDWN1\Legacy\Projects\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Factual Report 2021\60612561_F02_RobertsonBarracks_GWContour_A3P.mxd

A3 size



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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

1:14,000 (when printed at A3)

LEGEND

- Groundwater Monitoring Locations
- Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
- Denotes new exceedence of human health screening criteria
- Groundwater Monitoring Locations - Dry
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2021
GW data AECOM 2021
Aerial Nearmap 2021

Department of Defence

Robertson Barracks Groundwater Results

November 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted]
VERSION:	1

Figure 3

Filename: L:\Legacy\Projects\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Factual Report 2021\60612561_F03_RobertsonBarracks_GWResults_A3P.mxd

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Appendix B

Tables

Table B1
Groundwater Field Results
PFAS OMP
Department of Defence - Robertson Barracks

AECOM

Location ID	Sampled Date	Depth to Water (m btoc)	Well Depth (m btoc)	Water Elevation (m AHD)	TOC (m AHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr) (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method	Comments
MW001	03/11/2021	2.862	8.20	21.51	24.37	Good	0.84	100.7	65.5	4.4	172.9	376.4	28.9	Medium	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW004	03/11/2021	5.500	8.35	21.28	26.78	Good	0.44	489.3	318.0	4.5	-52.3	149.4	31.3	Turbid	Orange / Brown	Organic Odour	Sheen	Hydrasleeve	
MW004D	03/11/2021	5.500	31.80	21.28	26.78	Good	0.87	371.6	241.5	5.1	-56.8	145.0	31.1	Medium	Orange / Brown	Hydrogen Sulphide odour	No sheen	Hydrasleeve	
MW012	02/11/2021	6.161	10.67	24.49	30.65	Good	1.75	36.9	24.0	4.7	213.2	415.6	30.3	Low	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW012D	02/11/2021	8.438	30.70	22.33	30.77	Good	0.81	39.5	25.7	4.5	129.1	331.6	30.2	Low	Yellow / Brown	Rotten egg smell (sulfurous)	No sheen	Hydrasleeve	
MW018	02/11/2021	4.588	8.72	20.98	25.57	Good	0.7	41.4	26.9	4.0	218.2	420.9	30	Low	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW021	02/11/2021	3.409	8.72	14.62	18.03	Good	2.28	43.7	28.4	4.2	199.2	401.6	30.4	Medium	Orange / Brown	Organic Odour	No sheen	Hydrasleeve	
MW021D	02/11/2021	3.299	31.10	14.69	17.99	Good	0.86	142.8	92.8	4.6	131.2	333.6	30.3	Medium	Orange / Brown	Organic Odour	No sheen	Hydrasleeve	
MW024	03/11/2021	3.425	8.93	2.92	6.34	Good	1.54	1902	1236.3	4.5	148.7	349.8	32.1	Turbid	Yellow / Brown		No sheen	Hydrasleeve	
MW029	02/11/2021	2.997	7.82	21.00	24.00	Good	1.28	51.1	33.2	4.1	137.7	339.3	31.4	Turbid	Orange / Brown	Slight Organic Odour	No sheen	Hydrasleeve	
MW030	02/11/2021	2.490	7.16	17.01	19.50	Good	1.85	44	28.6	3.8	168.2	371.0	29.8	Turbid	Yellow / Brown	Organic Odour	No sheen	Hydrasleeve	
MW031	02/11/2021	4.199	8.15	22.36	26.56	Good	0.89	52.9	34.4	3.7	196.4	398.1	31.3	Turbid	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW032	02/11/2021	5.680	8.72	19.76	25.44	Good	1.22	83.8	54.5	4.0	188.1	389.7	31.4	Medium	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW034	02/11/2021	5.209	11.40	20.35	25.56	Good	1.91	87.9	57.1	5.3	162.5	366.2	28.6	Low	Orange / Brown	Slight Organic Odour	No sheen	Hydrasleeve	
MW066	03/11/2021	5.925	11.93	13.94	19.86	Damaged	2.06	52.5	34.1	4.8	197.5	398.6	32.1	Low	Grey	No odour	No sheen	Hydrasleeve	
MW080	03/11/2021	4.636	12.99	18.55	23.19	Good	1.28	59	38.4	4.0	196.3	397.5	32	Medium	Yellow / Brown	No odour	No sheen	Hydrasleeve	
MW112	02/11/2021	Did not measure due to tapped well					1.11	279.4	181.6	5.9	32.9	239.3	24.9	Medium	Orange / Brown	No odour	No sheen	Grab Sample	
MW113	02/11/2021	Did not measure due to tapped well					1.34	361.8	235.2	5.9	98.8	305.3	24.8	Low	Grey	No odour	No sheen	Grab Sample	

Notes:
mbtoc: meters below top of casing
mAHD: meters Australian Height Datum
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius
Redox Corrected = redox potential relative to the standard hydrogen electrode (Eh = Er + 200mV)

Table B2
Groundwater Analytical Results
PFAS Ongoing Monitoring Program
Department of Defence - Roberston Barracks

Groundwater Analytical Results - Robertson Barracks

AECOM

						PFAS Full Suite																														
						10:2 FTS	4:2 FTS	6:2 FtS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBS	PFBA	PFDS	PFDA	PFDoDA	PFHpS	PFHpA	PFHxA	PFNA	FOSA	PFPeS	PFPeA	PFTrDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFHxS and PFOS	PFOS	PFOA	PFHxS
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.02**	**0.05**	**0.05**	**0.02**	**0.05**	**0.02**	**0.10**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
Ecological Receptors	PFAS NEMP FW 99% Species Protection																															**0.00023**	**19**	
Human Health Receptors	PFAS NEMP Human Health Drinking Water																														**0.07**		**0.56**	
	NHMRC (2019) PFAS Recreational Water																														**2**		**10**	
Location Code	**Field_ID**	**Sample Date**	**Sample Type**	**Lab Report**																																
On-Site Monitoring Location																																				
MW001	1200_MW001_211103	3/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.19	**0.19**	**0.14**	<0.01	0.05
	1200_QC101_211103	3/11/2021	Intralab Duplicate	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.16	**0.16**	**0.12**	<0.01	0.04
	1200_QC201_211103	3/11/2021	Interlab Duplicate	RN1334294	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	0.14	**0.14**	**0.099**	<0.01	0.044
MW004	1200_MW004_211103	3/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.14	<0.02	<0.02	<0.02	0.16	<0.05	<0.02	<0.02	0.74	**0.44**	**0.32**	<0.01	0.12
MW004D	1200_MW004D_211103	3/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012	1200_MW012_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012D	1200_MW012D_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW018	1200_MW018_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW034	1200_MW034_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	0.03	0.07	<0.02	<0.02	<0.02	0.06	<0.05	<0.02	<0.02	0.29	**0.12**	**0.09**	0.01	0.03
MW066	1200_MW066_211103	3/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.6	**0.54**	**0.42**	0.02	0.12
MW080	1200_MW080_211103	3/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.03	**0.03**	**0.02**	<0.01	**0.01**
Off-Site Monitoring Location																																				
MW021	1200_MW021_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021D	1200_MW021D_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW024	1200_MW024_211103	3/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW029	1200_MW029_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW030	1200_MW030_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	**0.41**	**0.4**	**0.32**	**0.01**	**0.08**
MW031	1200_MW031_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW032	1200_MW032_211102	2/11/2021	Primary	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.1	**0.08**	**0.05**	<0.01	0.03
	1200_QC100_211102	2/11/2021	Intralab Duplicate	ES2139848	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.12	**0.08**	**0.05**	<0.01	0.03
	1200_QC200_211102	2/11/2021	Interlab Duplicate	RN1334294	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	<0.01	<0.01	<0.01	0.021	<0.02	<0.02	<0.01	**0.11**	**0.10**	**0.069**	<0.01	0.028
MW112	0107_MW112_211102	2/11/2021	Primary	ES2139847	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW113	0107_MW113_211102	2/11/2021	Primary	ES2139847	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01

Notes:
µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Bold indicates result above guideline value
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedance of human health screening criteria

Appendix C

Sampling Logs

Table C1
Groundwater Field Results
PFAS OMP
Department of Defence - Robertson Barracks

Groundwater Field Results - Robertson Barracks

AECOM

Location ID	Sampled Date	Depth to Water (m btoc)	Well Depth (m btoc)	Water Elevation (m AHD)	TOC (m AHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr) (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method	Comments
MW001	03/11/2021	2.862	8.20	21.51	24.37	Good	0.84	100.7	65.5	4.4	172.9	376.4	28.9	Medium	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW004	03/11/2021	5.500	8.35	21.28	26.78	Good	0.44	489.3	318.0	4.5	-52.3	149.4	31.3	Turbid	Orange / Brown	Organic odour	Sheen	Hydrasleeve	Roots above H/S
MW004D	03/11/2021	5.500	31.80	21.28	26.78	Good	0.87	371.6	241.5	5.1	-56.8	145.0	31.1	Medium	Orange / Brown	Hydrogen sulphide odour	No sheen	Hydrasleeve	
MW012	02/11/2021	6.161	10.67	24.49	30.65	Good	1.75	36.9	24.0	4.7	213.2	415.6	30.3	Low	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW012D	02/11/2021	8.438	30.70	22.33	30.77	Good	0.81	39.5	25.7	4.5	129.1	331.6	30.2	Low	Yellow / Brown	Rotten egg smell (sulfurous)	No sheen	Hydrasleeve	
MW018	02/11/2021	4.588	8.72	20.98	25.57	Good	0.7	41.4	26.9	4.0	218.2	420.9	30	Low	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW021	02/11/2021	3.409	8.72	14.62	18.03	Good	2.28	43.7	28.4	4.2	199.2	401.6	30.4	Medium	Orange / Brown	Organic odour	No sheen	Hydrasleeve	
MW021D	02/11/2021	3.299	31.10	14.69	17.99	Good	0.86	142.8	92.8	4.6	131.2	333.6	30.3	Medium	Orange / Brown	Organic odour	No sheen	Hydrasleeve	
MW024	03/11/2021	3.425	8.93	2.92	6.34	Good	1.54	1902	1236.3	4.5	148.7	349.8	32.1	Turbid	Yellow / Brown	No odour	No sheen	Hydrasleeve	
MW029	02/11/2021	2.997	7.82	21.00	24.00	Good	1.28	51.1	33.2	4.1	137.7	339.3	31.4	Turbid	Orange / Brown	Slight organic odour	No sheen	Hydrasleeve	
MW030	02/11/2021	2.490	7.16	20.84	23.33	Good	1.85	44	28.6	3.8	168.2	371.0	29.8	Turbid	Yellow / Brown	Organic odour	No sheen	Hydrasleeve	
MW031	02/11/2021	4.199	8.15	22.36	26.56	Good	0.89	52.9	34.4	3.7	196.4	398.1	31.3	Turbid	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW032	02/11/2021	5.680	8.72	19.76	25.44	Good	1.22	83.8	54.5	4.0	188.1	389.7	31.4	Medium	Orange / Brown	No odour	No sheen	Hydrasleeve	
MW034	02/11/2021	5.209	11.40	20.35	25.56	Good	1.91	87.9	57.1	5.3	162.5	366.2	28.6	Low	Orange / Brown	Slight organic odour	No sheen	Hydrasleeve	
MW066	03/11/2021	5.925	11.93	17.27	23.19	Damaged	2.06	52.5	34.1	4.8	197.5	398.6	32.1	Low	Grey	No odour	No sheen	Hydrasleeve	Broken / Cracked gatic Lid
MW080	03/11/2021	4.636	12.99	21.92	26.56	Good	1.28	59	38.4	4.0	196.3	397.5	32	Medium	Yellow / Brown	No odour	No sheen	Hydrasleeve	
MW112	02/11/2021	Did not measure due to tapped well					1.11	279.4	181.6	5.9	32.9	239.3	24.9	Medium	Orange / Brown	No odour	No sheen	Grab Sample	
MW113	02/11/2021	Did not measure due to tapped well					1.34	361.8	235.2	5.9	98.8	305.3	24.8	Low	Grey	No odour	No sheen	Grab Sample	

Notes:
mbtoc: meters below top of casing
mAHD: meters Australian Height Datum
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius
Redox Corrected = redox potential relative to the standard hydrogen electrode (Eh = Er + 200mV)

Appendix D

Data Validation Report

AECOM

DATA VALIDATION REPORT; WATER

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	15/11/2021
Site:	1200 – Robertson Barracks		[redacted]
Matrix:	Water	**Data Verified by:**	[redacted]
Laboratory:	ALS, NMI	**Date:**	17/12/2021
Lab reference:	ES2139847, ES2139848, RN1334294		[redacted]

Key Findings:
The analytical data can be used as a basis for interpretation, subject to the limitations outlined below:

- The potential exists for concentrations of PFOS to be below the LOR, but above the adopted guideline and this should be taken into consideration when interpreting results

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			
Number of tests requested/reported		✓			
Sample handling/preservation/holding times			✓	1	No
Frequency of laboratory QA/QC			✓	2	No
Limits of reporting (LOR)			✓	3	No
Blank analysis	Field blank	✓			
	Rinsate blank	✓			
	Trip blank	✓			
	Method blank	✓			
Field intra-laboratory relative percent differences (RPDs)		✓			
Field inter-laboratory RPDs		✓			
Laboratory duplicate RPDs		✓			
Matrix spike (MS) % recoveries		✓			
Laboratory control spike (LCS) % recoveries		✓			
Surrogate % recoveries		✓			
Other observations		✓			

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Comments	
1. Sample Handling	Primary, duplicate and triplicate groundwater samples were received preserved and chilled at the laboratory. The sample receipt temperatures for laboratory batches are as below: Batch Number / Temperature (°C) ES2139847 / 10.3 ES2139848 / 14.4 RN1334294 / 14.4 The sample receipt temperatures for all samples were outside the recommended temperature range (<6°C). However, as the temperature is recorded well below the ambient groundwater temperature at the time of sampling (~30°C) and samples were immediately cooled upon collection, the likelihood of under reporting is unlikely and immaterial to the interpretation of results.
2. Frequency of Laboratory QA/QC	Laboratory duplicate samples and matrix spike samples were not reported at the required frequencies for PFAS in the ALS lab batch ES2139848. The rate of laboratory duplicates was collected at 7.89%, slightly lower than the expected rate of 10.00%. The matrix spikes were collected at 2.63%, lower than the expected rate of 5.00%. The precision of the data can be assessed as acceptable based on: • Laboratory duplicate samples were not reported at the required frequencies for PFAS in the ALS lab batch ES2139848. The rate of laboratory duplicates was collected at 7.89%, slightly lower than the expected rate of 10.00%. The precision of the data can be assessed as acceptable based on intra- and inter-laboratory duplicate RPDs which were reported at or above the required frequencies and within control limits. • Matrix spike samples were not reported at the required frequencies for PFAS in the ALS lab batch ES2139848. The matrix spikes were collected at 2.63%, lower than the expected rate of 5.00%. The accuracy of the data can be assessed as acceptable based on method blanks, LCS and surrogate spike recoveries (which were reported at or above the required frequencies and within control limits)
3. Limits of Report	Limits of reporting were sufficiently low to enable assessment against adopted guideline criteria, except for PFOS. The potential exists for concentrations of key COPC PFOS to be above the PFAS NEMP fresh water 99% species protection guideline, but below the laboratory LOR. This should be taken into consideration when interpreting data and using data quantitatively.
4. Field inter-laboratory RPDs	Field intra-laboratory duplicate RPDs were reported above the 30% control limit, as outlined in the NEPM Schedule B3, for PFOS. The data is assessed as acceptable as the elevated RPDs for PFOS were reported less than 20 times the LOR and the RPD is less than 50%.

Appendix E

Chain of Custody

CHAIN OF CUSTODY

COC#: 29534 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 0107_SBRS

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 V3 / ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04-11-21 7 Am	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 Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0107_MW113_211102		02/11/2021 10:25 AM	Water	ALS: 2 Non ALS: 0	No	X		
002	0107_MW112_211102		02/11/2021 10:27 AM	Water	ALS: 2 Non ALS: 0	No	X		

Environmental Division Sydney

Work Order Reference

ES2139847

Telephone : [redacted]

CHAIN OF CUSTODY

COC#: 29534 *ALS Laboratory:* ES Sydney

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

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 0107_SBRS

ORDER NO:

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:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: / ES2019AECOMAU0030

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0107_MW113_211102	HDPE (no PTFE)	20 mL	00352010027852	Grey	No	
001	0107_MW113_211102	HDPE (no PTFE)	20 mL	00352010027929	Grey	No	
002	0107_MW112_211102	HDPE (no PTFE)	20 mL	00352010028124	Grey	No	
002	0107_MW112_211102	HDPE (no PTFE)	20 mL	00352010027990	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

Wednesday, November 3, 2021 11:14:24 PM

CHAIN OF CUSTODY

COC#: 29537 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 1200_RB

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE:

/ ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04.11.21 7AM	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 Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	1200_MW034_211102		02/11/2021 11:46 AM	Water	ALS: 2 Non ALS: 0	No	X		
002	1200_MW012_211102		02/11/2021 12:30 PM	Water	ALS: 2 Non ALS: 0	No	X		
003	1200_QC500_211102		02/11/2021 12:33 PM	Water	ALS: 2 Non ALS: 0	No	X		
004	1200_MW012D_211102		02/11/2021 12:39 PM	Water	ALS: 2 Non ALS: 0	No	X		
005	1200_MW018_211102		02/11/2021 02:21 PM	Water	ALS: 2 Non ALS: 0	No	X		
006	1200_QC300_211102		02/11/2021 02:37 PM	Water	ALS: 2 Non ALS: 0	No	X		
007	1200_QC400_211102		02/11/2021 02:38 PM	Water	ALS: 2 Non ALS: 0	No	X		
008	1200_MW021_211102		02/11/2021 03:18 PM	Water	ALS: 2 Non ALS: 0	No	X		
009	1200_MW021D_211102		02/11/2021 03:19 PM	Water	ALS: 2 Non ALS: 0	No	X		

Subcon / Forward Lab / Split WO

Lab / Analysis: NMI

Organised By / Date: QC200, QC201

Relinquished By / Date:

Connote / Courier:

WO No: ES2139848

Attach By PO / Internal Sheet:

Environmental Division Sydney

Work Order Reference

ES2139848

Telephone : [redacted]

CHAIN OF CUSTODY

ALS COC#: 29537 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04-11-21 7AM	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 1200_RB

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE:

/ ES2019AECOMAU0030

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 DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	1200_MW032_211102	Extra bottle for lab QC	02/11/2021 04:36 PM	Water	ALS: 3 Non ALS: 0	No	X		
011	1200_QC100_211102		02/11/2021 04:37 PM	Water	ALS: 2 Non ALS: 0	No	X		
012	1200_QC200_211102	Please forward to NMI Sydney	02/11/2021 04:39 PM	Water	ALS: 2 Non ALS: 0	No	X		Please forward to NMI Sydney
013	1200_MW031_211102		02/11/2021 05:13 PM	Water	ALS: 2 Non ALS: 0	No	X		
014	1200_MW030_211102	Extra bottle for lab QC	02/11/2021 05:34 PM	Water	ALS: 3 Non ALS: 0	No	X		
015	1200_MW029_211102		02/11/2021 05:50 PM	Water	ALS: 2 Non ALS: 0	No	X		
016	1200_QC401_211103		03/11/2021 09:36 AM	Water	ALS: 2 Non ALS: 0	No	X		
017	1200_QC101_211103		03/11/2021 09:41 AM	Water	ALS: 2 Non ALS: 0	No	X		
018	1200_QC201_211103	Please forward to NMI Sydney	03/11/2021 09:42 AM	Water	ALS: 2 Non ALS: 0	No	X		

CHAIN OF CUSTODY

COC#: 29537 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04-11-21 7AM	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 1200_RB

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: / ES2019AECOMAU0030

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	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	1200_MW001_211103	Extra volume for lab QC	03/11/2021 09:44 AM	Water	ALS: 3 Non ALS: 0	No	X		
020	1200_QC301_211103		03/11/2021 09:45 AM	Water	ALS: 2 Non ALS: 0	No	X		
021	1200_MW080_211103		03/11/2021 10:06 AM	Water	ALS: 2 Non ALS: 0	No	X		
022	1200_MW004_211103		03/11/2021 10:38 AM	Water	ALS: 2 Non ALS: 0	No	X		
023	1200_MW004D_211103		03/11/2021 10:39 AM	Water	ALS: 2 Non ALS: 0	No	X		
024	1200_MW066_211103		03/11/2021 11:03 AM	Water	ALS: 2 Non ALS: 0	No	X		
025	1200_MW024_211103		03/11/2021 11:49 AM	Water	ALS: 2 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 29537 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04.11.21 7AM	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 1200_RB

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 V3 / ES2019AECOMAU003 0

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	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	1200_MW034_211102	HDPE (no PTFE)	20 mL	00352010028296	Grey	No	
001	1200_MW034_211102	HDPE (no PTFE)	20 mL	00352010028053	Grey	No	
002	1200_MW012_211102	HDPE (no PTFE)	20 mL	00352010028035	Grey	No	
002	1200_MW012_211102	HDPE (no PTFE)	20 mL	00352010028021	Grey	No	
003	1200_QC500_211102	HDPE (no PTFE)	20 mL	00352010027901	Grey	No	
003	1200_QC500_211102	HDPE (no PTFE)	20 mL	00352010027997	Grey	No	
004	1200_MW012D_211102	HDPE (no PTFE)	20 mL	00352010028255	Grey	No	
004	1200_MW012D_211102	HDPE (no PTFE)	20 mL	00352010027923	Grey	No	
005	1200_MW018_211102	HDPE (no PTFE)	20 mL	00352010028095	Grey	No	
005	1200_MW018_211102	HDPE (no PTFE)	20 mL	00352010028201	Grey	No	
006	1200_QC300_211102	HDPE (no PTFE)	20 mL	00352010028285	Grey	No	
006	1200_QC300_211102	HDPE (no PTFE)	20 mL	00352010028135	Grey	No	
007	1200_QC400_211102	HDPE (no PTFE)	20 mL	00352010027944	Grey	No	
007	1200_QC400_211102	HDPE (no PTFE)	20 mL	00352010027925	Grey	No	
008	1200_MW021_211102	HDPE (no PTFE)	20 mL	00352010028265	Grey	No	
008	1200_MW021_211102	HDPE (no PTFE)	20 mL	00352010028305	Grey	No	
009	1200_MW021D_211102	HDPE (no PTFE)	20 mL	00352010027920	Grey	No	
009	1200_MW021D_211102	HDPE (no PTFE)	20 mL	00352010028050	Grey	No	
010	1200_MW032_211102	HDPE (no PTFE)	20 mL	00352010028016	Grey	No	
010	1200_MW032_211102	HDPE (no PTFE)	20 mL	00352010028366	Grey	No	
010	1200_MW032_211102	HDPE (no PTFE)	20 mL	00350719054423	Grey	No	
011	1200_QC100_211102	HDPE (no PTFE)	20 mL	00352010028131	Grey	No	
011	1200_QC100_211102	HDPE (no PTFE)	20 mL	00352010027855	Grey	No	
012	1200_QC200_211102	HDPE (no PTFE)	20 mL	00352010028186	Grey	No	
012	1200_QC200_211102	HDPE (no PTFE)	20 mL	00352010028183	Grey	No	
013	1200_MW031_211102	HDPE (no PTFE)	20 mL	00352010028036	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 29537 ALS Laboratory: ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 1200_RB

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE:

/ ES2019AECOMAU0030

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04.11.21 7AM	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:

013	1200_MW031_211102	HDPE (no PTFE)	20 mL	00352010027854	Grey	No	
014	1200_MW030_211102	HDPE (no PTFE)	20 mL	00352010027889	Grey	No	
014	1200_MW030_211102	HDPE (no PTFE)	20 mL	00352010028235	Grey	No	
014	1200_MW030_211102	HDPE (no PTFE)	20 mL	00350219023436	Grey	No	
015	1200_MW029_211102	HDPE (no PTFE)	20 mL	00352010028134	Grey	No	
015	1200_MW029_211102	HDPE (no PTFE)	20 mL	00352010028350	Grey	No	
016	1200_QC401_211103	HDPE (no PTFE)	20 mL	00352010027962	Grey	No	
016	1200_QC401_211103	HDPE (no PTFE)	20 mL	00352010027975	Grey	No	
017	1200_QC101_211103	HDPE (no PTFE)	20 mL	00352010028314	Grey	No	
017	1200_QC101_211103	HDPE (no PTFE)	20 mL	00352010028355	Grey	No	
018	1200_QC201_211103	HDPE (no PTFE)	20 mL	00352010028306	Grey	No	
018	1200_QC201_211103	HDPE (no PTFE)	20 mL	00352010028359	Grey	No	
019	1200_MW001_211103	HDPE (no PTFE)	20 mL	00352010028317	Grey	No	
019	1200_MW001_211103	HDPE (no PTFE)	20 mL	00352010027871	Grey	No	
019	1200_MW001_211103	HDPE (no PTFE)	20 mL	00350719054421	Grey	No	
020	1200_QC301_211103	HDPE (no PTFE)	20 mL	00352010027888	Grey	No	
020	1200_QC301_211103	HDPE (no PTFE)	20 mL	00352010027951	Grey	No	
021	1200_MW080_211103	HDPE (no PTFE)	20 mL	00352010028089	Grey	No	
021	1200_MW080_211103	HDPE (no PTFE)	20 mL	00352010027930	Grey	No	
022	1200_MW004_211103	HDPE (no PTFE)	20 mL	00352010028228	Grey	No	
022	1200_MW004_211103	HDPE (no PTFE)	20 mL	00352010028019	Grey	No	
023	1200_MW004D_211103	HDPE (no PTFE)	20 mL	00352010028276	Grey	No	
023	1200_MW004D_211103	HDPE (no PTFE)	20 mL	00352010028197	Grey	No	
024	1200_MW066_211103	HDPE (no PTFE)	20 mL	00352010027908	Grey	No	
024	1200_MW066_211103	HDPE (no PTFE)	20 mL	00352010027884	Grey	No	
025	1200_MW024_211103	HDPE (no PTFE)	20 mL	00352010028391	Grey	No	
025	1200_MW024_211103	HDPE (no PTFE)	20 mL	00352010027931	Grey	No	

CHAIN OF CUSTODY

COC#: 29537 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: PFAS OMP Robertson Barracks

SITE: 1200_RB

ORDER NO:

PROJECT MANAGER [redacted]
PRIMARY SAMPLER: [redacted]

CONTACT PH:
QUOTE NO: SY/139/19 V3

SAMPLER MOBILE:
/ ES2019AECOMAU0030

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY: [redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 04-11-21 7AM	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:

Total Bottle Count: ALS: 53, Non ALS: 0

Wednesday, November 3, 2021 11:14:24 PM

Appendix F

Laboratory Certificates

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2139847**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: GPO BOX 3175 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ---	Telephone	: [redacted]
Facsimile	: ---	Facsimile	: [redacted]
Project	: PFAS OMP Robertson Barracks	Page	: 1 of 3
Order number	: -	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: 29534	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: 0107_SBRS		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 04-Nov-2021 07:00	Issue Date	: 04-Nov-2021
Client Requested Due Date	: 11-Nov-2021	Scheduled Reporting Date	: **11-Nov-2021**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 10.3' C - 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
- **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 direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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)
ES2139847-001	02-Nov-2021 08:55	0107_MW113_211102	✓
ES2139847-002	02-Nov-2021 08:57	0107_MW112_211102	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

APCORP

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

DERP ESDAT REPORTS

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2139847**	Page	: 1 of 5
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: GPO BOX 3175 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: —	Telephone	: [redacted]
Project	: PFAS OMP Robertson Barracks	Date Samples Received	: 04-Nov-2021 07:00
Order number	: -	Date Analysis Commenced	: 04-Nov-2021
C-O-C number	: 29534	Issue Date	: 10-Nov-2021 10:25
Sampler	: [redacted], [redacted]		
Site	: 0107_SBRS		
Quote number	: SY/139/19 V3		
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*
[redacted]	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 Contact for details.

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

- EP231X - 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.
- 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: WATER (Matrix: WATER)				Sample ID	0107_MW113_211102	0107_MW112_211102	---	---	---
				Sampling date / time	02-Nov-2021 08:55	02-Nov-2021 08:57	---	---	---
Compound	CAS Number	LOR	Unit		ES2139847-001	ES2139847-002	-----	-----	-----
					Result	Result	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	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	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0107_MW113_211102	0107_MW112_211102	---	---	---
				Sampling date / time	02-Nov-2021 08:55	02-Nov-2021 08:57	---	---	---
Compound	CAS Number	LOR	Unit		ES2139847-001	ES2139847-002	------	------	------
					Result	Result	---	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		<0.01	<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	%		103	100	---	---	---
13C8-PFOA	---	0.02	%		95.8	98.6	---	---	---

Surrogate Control Limits

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2139847**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: GPO BOX 3175 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: —	Telephone	: [redacted]
Project	: PFAS OMP Robertson Barracks	Date Samples Received	: 04-Nov-2021
Order number	: -	Date Analysis Commenced	: 04-Nov-2021
C-O-C number	: 29534	Issue Date	: 10-Nov-2021
Sampler	: [redacted], [redacted]		
Site	: 0107_SBRS		
Quote number	: SY/139/19 V3		
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*
[redacted]	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4001647)									
ES2139848-014	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.32	0.32	0.0	0% - 20%
		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
ES2139848-010	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	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: 4001647)									
ES2139848-014	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 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: 4001647) - continued									
ES2139848-010	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: 4001647)									
ES2139848-014	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
ES2139848-010	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: 4001647)									
ES2139848-014	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

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: 4001647) - continued									
ES2139848-014	Anonymous	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
ES2139848-010	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: 4001647)									
ES2139848-014	Anonymous	EP231X: Sum of PFAS	---	0.01	µg/L	0.41	0.41	0.0	0% - 20%
ES2139848-010	Anonymous	EP231X: Sum of PFAS	---	0.01	µg/L	0.10	0.10	0.0	0% - 50%

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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4001647)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	96.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	91.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	118	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	105	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4001647)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	108	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	118	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	96.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4001647)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	80.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.1	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	84.3	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	99.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4001647)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	90.0	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	106	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	106	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: 4001647) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	99.4	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4001647)							
ES2139848-019	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	99.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	95.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	104	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	118	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4001647)							
ES2139848-019	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	102	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	100	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	104	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	112	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	109	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	103	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	103	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	94.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4001647)							
ES2139848-019	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	90.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	98.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	89.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	107	65.0	136

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: 4001647) - continued							
ES2139848-019	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4001647)							
ES2139848-019	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	99.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	106	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	98.4	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2139847**	Page	: 1 of 4
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: PFAS OMP Robertson Barracks	Date Samples Received	: 04-Nov-2021
Site	: 0107_SBRS	Issue Date	: 10-Nov-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 2
Order number	: -	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: **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)							
0107_MW113_211102, 0107_MW112_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0107_MW113_211102, 0107_MW112_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0107_MW113_211102, 0107_MW112_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0107_MW113_211102, 0107_MW112_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0107_MW113_211102, 0107_MW112_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓

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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

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
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.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2139848**		
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: GPO BOX 3175 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ---	Telephone	: [redacted]
Facsimile	: ---	Facsimile	: [redacted]
Project	: NT_1200_PFASOMP	Page	: 1 of 3
Order number	: -	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: 29537	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: 1200_RB		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 04-Nov-2021 07:00	Issue Date	: 23-Nov-2021
Client Requested Due Date	: 11-Nov-2021	Scheduled Reporting Date	: **11-Nov-2021**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ---	Temperature	: 14.4' C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 23 / 23

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Samples QC200 and QC201 have been forwarded to NMI as per COC requested.**
- **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 direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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.

ES2139848-010	: 02-Nov-2021 15:06	: 1200_MW032_211102 - Extra bottle for lab QC
ES2139848-014	: 02-Nov-2021 16:04	: 1200_MW030_211102 - Extra bottle for lab QC
ES2139848-019	: 03-Nov-2021 08:14	: 1200_MW001_211103 - Extra volume for lab QC

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)
ES2139848-001	02-Nov-2021 10:16	1200_MW034_211102	✓
ES2139848-002	02-Nov-2021 11:00	1200_MW012_211102	✓
ES2139848-003	02-Nov-2021 11:03	1200_QC500_211102	✓
ES2139848-004	02-Nov-2021 11:09	1200_MW012D_211102	✓
ES2139848-005	02-Nov-2021 12:51	1200_MW018_211102	✓
ES2139848-006	02-Nov-2021 13:07	1200_QC300_211102	✓
ES2139848-007	02-Nov-2021 13:08	1200_QC400_211102	✓
ES2139848-008	02-Nov-2021 13:48	1200_MW021_211102	✓
ES2139848-009	02-Nov-2021 13:49	1200_MW021D_211102	✓
ES2139848-010	02-Nov-2021 15:06	1200_MW032_211102 E...	✓
ES2139848-011	02-Nov-2021 15:07	1200_QC100_211102	✓
ES2139848-013	02-Nov-2021 15:43	1200_MW031_211102	✓
ES2139848-014	02-Nov-2021 16:04	1200_MW030_211102 E...	✓
ES2139848-015	02-Nov-2021 16:20	1200_MW029_211102	✓
ES2139848-016	03-Nov-2021 08:06	1200_QC401_211103	✓
ES2139848-017	03-Nov-2021 08:11	1200_QC101_211103	✓
ES2139848-019	03-Nov-2021 08:14	1200_MW001_211103 E...	✓
ES2139848-020	03-Nov-2021 08:15	1200_QC301_211103	✓
ES2139848-021	03-Nov-2021 08:36	1200_MW080_211103	✓
ES2139848-022	03-Nov-2021 09:08	1200_MW004_211103	✓
ES2139848-023	03-Nov-2021 09:09	1200_MW004D_211103	✓
ES2139848-024	03-Nov-2021 09:33	1200_MW066_211103	✓
ES2139848-025	03-Nov-2021 10:19	1200_MW024_211103	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AP_CustomerService.ANZ@aecom.com

APCORP

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

DERP ESDAT REPORTS

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2139848**	Page	: 1 of 13
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: GPO BOX 3175 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 04-Nov-2021 07:00
Order number	: -	Date Analysis Commenced	: 04-Nov-2021
C-O-C number	: 29537	Issue Date	: 23-Nov-2021 10:27
Sampler	: [redacted], [redacted]		
Site	: 1200_RB		
Quote number	: SY/139/19 V3		
No. of samples received	: 23		
No. of samples analysed	: 23		

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*
[redacted]	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 Contact for details.

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

- EP231X - 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.
- Amendment (23/11/2021): This report has been amended to alter the project reference. All analysis results are as per the previous report.
- 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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW034_211102	1200_MW012_211102	1200_QC500_211102	1200_MW012D_211102	1200_MW018_211102
				Sampling date / time	02-Nov-2021 10:16	02-Nov-2021 11:00	02-Nov-2021 11:03	02-Nov-2021 11:09	02-Nov-2021 12:51
					ES2139848-001	ES2139848-002	ES2139848-003	ES2139848-004	ES2139848-005
					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		**0.03**	<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		**0.09**	<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		**0.06**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.07**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.03**	<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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW034_211102	1200_MW012_211102	1200_QC500_211102	1200_MW012D_211102	1200_MW018_211102
				Sampling date / time	02-Nov-2021 10:16	02-Nov-2021 11:00	02-Nov-2021 11:03	02-Nov-2021 11:09	02-Nov-2021 12:51
					ES2139848-001	ES2139848-002	ES2139848-003	ES2139848-004	ES2139848-005
					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		**0.29**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.12**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.29**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**107**	**101**	**99.9**	**102**	**102**
13C8-PFOA	---	0.02	%		**95.4**	**97.8**	**96.9**	**98.1**	**97.7**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC300_211102	1200_QC400_211102	1200_MW021_211102	1200_MW021D_211102	1200_MW032_211102 Extra bottle for lab QC
				Sampling date / time	02-Nov-2021 13:07	02-Nov-2021 13:08	02-Nov-2021 13:48	02-Nov-2021 13:49	02-Nov-2021 15:06
					ES2139848-006	ES2139848-007	ES2139848-008	ES2139848-009	ES2139848-010
					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	**0.03**
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	**0.05**
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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC300_211102	1200_QC400_211102	1200_MW021_211102	1200_MW021D_211102	1200_MW032_211102 Extra bottle for lab QC
				Sampling date / time	02-Nov-2021 13:07	02-Nov-2021 13:08	02-Nov-2021 13:48	02-Nov-2021 13:49	02-Nov-2021 15:06
					ES2139848-006	ES2139848-007	ES2139848-008	ES2139848-009	ES2139848-010
					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	**0.10**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.08**
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.10**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**103**	**113**	**107**	**103**	**102**
13C8-PFOA	---	0.02	%		**97.0**	**101**	**104**	**100**	**97.6**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC100_211102	1200_MW031_211102	1200_MW030_211102 Extra bottle for lab QC	1200_MW029_211102	1200_QC401_211103
				Sampling date / time	02-Nov-2021 15:07	02-Nov-2021 15:43	02-Nov-2021 16:04	02-Nov-2021 16:20	03-Nov-2021 08:06
					ES2139848-011	ES2139848-013	ES2139848-014	ES2139848-015	ES2139848-016
					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		**0.03**	<0.01	**0.08**	<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		**0.05**	<0.01	**0.32**	<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: WATER (Matrix: WATER)				Sample ID	1200_QC100_211102	1200_MW031_211102	1200_MW030_211102 Extra bottle for lab QC	1200_MW029_211102	1200_QC401_211103
				Sampling date / time	02-Nov-2021 15:07	02-Nov-2021 15:43	02-Nov-2021 16:04	02-Nov-2021 16:20	03-Nov-2021 08:06
Compound	CAS Number	LOR	Unit		ES2139848-011	ES2139848-013	ES2139848-014	ES2139848-015	ES2139848-016
					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		**0.12**	<0.01	**0.41**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.08**	<0.01	**0.40**	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.12**	<0.01	**0.41**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**106**	**104**	**102**	**104**	**103**
13C8-PFOA	---	0.02	%		**96.9**	**95.8**	**97.6**	**96.7**	**98.2**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC101_211103	1200_MW001_211103 Extra volume for lab QC	1200_QC301_211103	1200_MW080_211103	1200_MW004_211103
				Sampling date / time	03-Nov-2021 08:11	03-Nov-2021 08:14	03-Nov-2021 08:15	03-Nov-2021 08:36	03-Nov-2021 09:08
					ES2139848-017	ES2139848-019	ES2139848-020	ES2139848-021	ES2139848-022
					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		**0.04**	**0.05**	<0.01	**0.01**	**0.12**
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		**0.12**	**0.14**	<0.01	**0.02**	**0.32**
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	**0.16**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.14**
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

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC101_211103	1200_MW001_211103 Extra volume for lab QC	1200_QC301_211103	1200_MW080_211103	1200_MW004_211103
				Sampling date / time	03-Nov-2021 08:11	03-Nov-2021 08:14	03-Nov-2021 08:15	03-Nov-2021 08:36	03-Nov-2021 09:08
					ES2139848-017	ES2139848-019	ES2139848-020	ES2139848-021	ES2139848-022
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	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		**0.16**	**0.19**	<0.01	**0.03**	**0.74**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.16**	**0.19**	<0.01	**0.03**	**0.44**
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.16**	**0.19**	<0.01	**0.03**	**0.74**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**98.3**	**99.5**	**105**	**101**	**106**
13C8-PFOA	---	0.02	%		**98.0**	**96.2**	**101**	**98.3**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW004D_211103	1200_MW066_211103	1200_MW024_211103	---	---
				Sampling date / time	03-Nov-2021 09:09	03-Nov-2021 09:33	03-Nov-2021 10:19	---	---
Compound	CAS Number	LOR	Unit		ES2139848-023	ES2139848-024	ES2139848-025	-----	-----
					Result	Result	Result	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**0.12**	<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	**0.42**	<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	**0.04**	<0.02	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.02**	<0.01	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW004D_211103	1200_MW066_211103	1200_MW024_211103	---	---
				Sampling date / time	03-Nov-2021 09:09	03-Nov-2021 09:33	03-Nov-2021 10:19	---	---
Compound	CAS Number	LOR	Unit		ES2139848-023	ES2139848-024	ES2139848-025	-----	-----
					Result	Result	Result	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		<0.01	**0.60**	<0.01	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.54**	<0.01	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.60**	<0.01	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**104**	**102**	**102**	---	---
13C8-PFOA	---	0.02	%		**102**	**97.8**	**104**	---	---

Surrogate Control Limits

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2139848**	Page	: 1 of 9
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: GPO BOX 3175 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 04-Nov-2021
Order number	: -	Date Analysis Commenced	: 04-Nov-2021
C-O-C number	: 29537	Issue Date	: 23-Nov-2021
Sampler	: [redacted], [redacted]		
Site	: 1200_RB		
Quote number	: SY/139/19 V3		
No. of samples received	: 23		
No. of samples analysed	: 23		

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*
[redacted]	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4001647)									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.32	0.32	0.0	0% - 20%
		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
ES2139848-010	1200_MW032_211102 Extra bottle for lab QC	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	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: 4001690)									
ES2139921-001	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4001647)									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	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 (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4001647) - continued									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	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
ES2139848-010	1200_MW032_211102 Extra bottle for lab QC	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: 4001690)									
ES2139921-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	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: 4001647)									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	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: 4001647) - continued									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	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
ES2139848-010	1200_MW032_211102 Extra bottle for lab QC	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: 4001690)									
ES2139921-001	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: 4001647)									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	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: 4001647) - continued									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	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
ES2139848-010	1200_MW032_211102 Extra bottle for lab QC	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: 4001690)									
ES2139921-001	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: 4001647)									
ES2139848-014	1200_MW030_211102 Extra bottle for lab QC	EP231X: Sum of PFAS	---	0.01	µg/L	0.41	0.41	0.0	0% - 20%
ES2139848-010	1200_MW032_211102 Extra bottle for lab QC	EP231X: Sum of PFAS	---	0.01	µg/L	0.10	0.10	0.0	0% - 50%
EP231P: PFAS Sums (QC Lot: 4001690)									
ES2139921-001	Anonymous	EP231X: Sum of PFAS	---	0.01	µg/L	0.04	0.04	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4001647)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	96.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	91.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	118	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	105	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4001690)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	93.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	94.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	101	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	92.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4001647)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	108	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	118	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	96.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4001690)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	106	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	96.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	103	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	100	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.8	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: 4001690) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	96.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	107	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4001647)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	80.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.1	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	84.3	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	99.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4001690)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	88.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	87.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	94.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	96.2	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	91.3	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	99.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	94.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4001647)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	90.0	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	106	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	106	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	99.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4001690)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.6	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	95.8	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	100	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	85.0	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**

				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: 4001647)							
ES2139848-019	1200_MW001_211103 Extra volume for lab QC	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	99.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	95.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	104	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	118	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4001647)							
ES2139848-019	1200_MW001_211103 Extra volume for lab QC	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	102	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	100	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	104	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	112	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	109	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	103	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	103	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	94.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4001647)							
ES2139848-019	1200_MW001_211103 Extra volume for lab QC	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	90.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	98.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	89.8	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	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4001647)							
ES2139848-019	1200_MW001_211103 Extra volume for lab QC	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	99.8	64.0	140

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: 4001647) - continued							
ES2139848-019	1200_MW001_211103 Extra volume for lab QC	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	106	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	98.4	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2139848**	Page	: 1 of 6
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 04-Nov-2021
Site	: 1200_RB	Issue Date	: 23-Nov-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 23
Order number	: -	No. of samples analysed	: 23

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

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

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	38	2.63	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **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)								
1200_MW034_211102,	1200_MW012_211102,	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
1200_QC500_211102,	1200_MW012D_211102,							
1200_MW018_211102,	1200_QC300_211102,							
1200_QC400_211102,	1200_MW021_211102,							
1200_MW021D_211102,	1200_MW032_211102 - Extra bottle for lab QC,							
1200_QC100_211102,	1200_MW031_211102,							
1200_MW030_211102 - Extra bottle for lab QC,	1200_MW029_211102							
HDPE (no PTFE) (EP231X)								
1200_QC401_211103,	1200_QC101_211103,	**03-Nov-2021**	**09-Nov-2021**	02-May-2022	✓	**09-Nov-2021**	02-May-2022	✓
1200_MW001_211103 - Extra volume for lab QC,	1200_QC301_211103,							
1200_MW080_211103,	1200_MW004_211103,							
1200_MW004D_211103,	1200_MW066_211103,							
1200_MW024_211103								

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)							
1200_MW034_211102, 1200_MW012_211102, 1200_QC500_211102, 1200_MW012D_211102, 1200_MW018_211102, 1200_QC300_211102, 1200_QC400_211102, 1200_MW021_211102, 1200_MW021D_211102, 1200_MW032_211102 - Extra bottle for lab QC, 1200_QC100_211102, 1200_MW031_211102, 1200_MW030_211102 - Extra bottle for lab QC, 1200_MW029_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_211103, 1200_QC101_211103, 1200_MW001_211103 - Extra volume for lab QC, 1200_QC301_211103, 1200_MW080_211103, 1200_MW004_211103, 1200_MW004D_211103, 1200_MW066_211103, 1200_MW024_211103	**03-Nov-2021**	**09-Nov-2021**	02-May-2022	✓	**09-Nov-2021**	02-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
1200_MW034_211102, 1200_MW012_211102, 1200_QC500_211102, 1200_MW012D_211102, 1200_MW018_211102, 1200_QC300_211102, 1200_QC400_211102, 1200_MW021_211102, 1200_MW021D_211102, 1200_MW032_211102 - Extra bottle for lab QC, 1200_QC100_211102, 1200_MW031_211102, 1200_MW030_211102 - Extra bottle for lab QC, 1200_MW029_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_211103, 1200_QC101_211103, 1200_MW001_211103 - Extra volume for lab QC, 1200_QC301_211103, 1200_MW080_211103, 1200_MW004_211103, 1200_MW004D_211103, 1200_MW066_211103, 1200_MW024_211103	**03-Nov-2021**	**09-Nov-2021**	02-May-2022	✓	**09-Nov-2021**	02-May-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
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW034_211102, 1200_MW012_211102, 1200_QC500_211102, 1200_MW012D_211102, 1200_MW018_211102, 1200_QC300_211102, 1200_QC400_211102, 1200_MW021_211102, 1200_MW021D_211102, 1200_MW032_211102 - Extra bottle for lab QC, 1200_QC100_211102, 1200_MW031_211102, 1200_MW030_211102 - Extra bottle for lab QC, 1200_MW029_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_211103, 1200_QC101_211103, 1200_MW001_211103 - Extra volume for lab QC, 1200_QC301_211103, 1200_MW080_211103, 1200_MW004_211103, 1200_MW004D_211103, 1200_MW066_211103, 1200_MW024_211103	**03-Nov-2021**	**09-Nov-2021**	02-May-2022	✓	**09-Nov-2021**	02-May-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_MW034_211102, 1200_MW012_211102, 1200_QC500_211102, 1200_MW012D_211102, 1200_MW018_211102, 1200_QC300_211102, 1200_QC400_211102, 1200_MW021_211102, 1200_MW021D_211102, 1200_MW032_211102 - Extra bottle for lab QC, 1200_QC100_211102, 1200_MW031_211102, 1200_MW030_211102 - Extra bottle for lab QC, 1200_MW029_211102	**02-Nov-2021**	**09-Nov-2021**	01-May-2022	✓	**09-Nov-2021**	01-May-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_211103, 1200_QC101_211103, 1200_MW001_211103 - Extra volume for lab QC, 1200_QC301_211103, 1200_MW080_211103, 1200_MW004_211103, 1200_MW004D_211103, 1200_MW066_211103, 1200_MW024_211103	**03-Nov-2021**	**09-Nov-2021**	02-May-2022	✓	**09-Nov-2021**	02-May-2022	✓

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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	**7.89**	**10.00**	✘	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	38	**2.63**	**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
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.

Australian Government
Department of Industry, Science, Energy and Resources

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

Attention: [redacted]

Customer: AECOM AUSTRALIA PTY LTD

Address: [redacted] 4006

Email: [redacted]

Telephone:

Fax:

LABORATORY DETAILS

Lab: National Measurement Institute

Contact: [redacted]

Address: [redacted], North Ryde, NSW NSW 2113

Email: [redacted]

Telephone: [redacted]

Fax:

SAMPLE DETAILS

NMI Job Name: **AECO06/211116/1**

Total No. of Samples: **2**

LRNs	Estimated Report Date	Customer Sample ID	Lab Sample Description
N21/025570	23-NOV-2021	1302_QC201_211110	WATER 10/11/2021 04:42 PM
N21/025571	23-NOV-2021	1302_QC202_211111	WATER 11/11/2021 10:54 AM

SAMPLE RECEIVED CONDITION

Date samples received: 16-NOV-2021

Sample received in good order: Yes

NMI Quotation no. provided:

Client purchase order number:

Temperature of samples: Chilled

Comments: ALL OK

Mode of Delivery: Courier

Additional Terms and Conditions

Incomplete / unclear information about samples or required testing will delay the start of the analysis work

If you require your Purchase Order (PO) number to be included on our invoice, please provide the number during sample submission and before the completion of work to avoid unnecessary delays and/or additional processing/handling fees.

The lodgement of an order or receipt of samples for NMI services referenced in this Sample Receipt Notification constitutes an acceptence of the current version of NMI Terms and Conditions or other applicable Terms referenced in the NMI Quotation. NMI Terms and Conditions are available on the web at https://www.industry.gov.au/client-services/testing-and-analysis-services/chemical-and-biological-analysis-services-terms-and-conditions

REPORT OF ANALYSIS

Report No. RN1334294

Client	: [redacted]	**Job No.**	: AECO06/211104
	[redacted]	**Quote No.**	: QT-02018
	[redacted]	**Order No.**	:
		Date Received	: 04-NOV-2021
Attention	: [redacted]	**Sampled By**	: CLIENT
Project Name	: 1200_RB PFASOMP ROBERTSON BARR		
Your Client Services Manager	: [redacted]	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N21/024545	1200_QC200_211102	WATER 02/11/2021 04:39 PM
N21/024546	1200_QC201_211103	WATER 03/11/2021 09:42 AM

Lab Reg No.		N21/024545	N21/024546			
Date Sampled		02-NOV-2021	03-NOV-2021			
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05	<0.05			NR70
PFPeA (2706-90-3)	ug/L	0.021	<0.02			NR70
PFHxA (307-24-4)	ug/L	0.017	<0.01			NR70
PFHpA (375-85-9)	ug/L	<0.01	<0.01			NR70
PFOA (335-67-1)	ug/L	<0.01	<0.01			NR70
PFNA (375-95-1)	ug/L	<0.01	<0.01			NR70
PFDA (335-76-2)	ug/L	<0.01	<0.01			NR70
PFUdA (2058-94-8)	ug/L	<0.01	<0.01			NR70
PFDoA (307-55-1)	ug/L	<0.01	<0.01			NR70
PFTrDA (72629-94-8)	ug/L	<0.02	<0.02			NR70
PFTeDA (376-06-7)	ug/L	<0.02	<0.02			NR70
PFHxDA (67905-19-5)	ug/L	<0.02	<0.02			NR70
PFODA (16517-11-6)	ug/L	<0.05	<0.05			NR70
FOUEA (70887-84-2)	ug/L	<0.01	<0.01			NR70
PFDS (335-77-3)	ug/L	<0.01	<0.01			NR70
PFPeS (2706-91-4)	ug/L	<0.01	<0.01			NR70
PFHxS (355-46-4)	ug/L	0.028	0.044			NR70
PFHpS (375-92-8)	ug/L	<0.01	<0.01			NR70
PFOS (1763-23-1)	ug/L	0.069	0.099			NR70
PFNS (68259-12-1)	ug/L	<0.01	<0.01			NR70
PFBS (375-73-5)	ug/L	<0.01	<0.01			NR70
PFOSA (754-91-6)	ug/L	<0.01	<0.01			NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02	<0.02			NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02	<0.02			NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01	<0.01			NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01	<0.01			NR70
N-MeFOSE (24448-09-7)	ug/L	<0.05	<0.05			NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05	<0.05			NR70
4:2 FTS (757124-72-4)	ug/L	<0.01	<0.01			NR70

REPORT OF ANALYSIS

Report No. RN1334294

Lab Reg No.		N21/024545	N21/024546			
Date Sampled		02-NOV-2021	03-NOV-2021			
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
6:2 FTS (27619-97-2)	ug/L	<0.01	<0.01			NR70
8:2 FTS (39108-34-4)	ug/L	<0.01	<0.01			NR70
10:2 FTS (120226-60-0)	ug/L	<0.01	<0.01			NR70
8:2 diPAP (678-41-1)	ug/L	<0.02	<0.02			NR70
PFBA (Surrogate Recovery)	%	106	108			NR70
PFPeA (Surrogate Recovery)	%	100	116			NR70
PFHxA (Surrogate Recovery)	%	106	106			NR70
PFHpA (Surrogate Recovery)	%	108	101			NR70
PFOA (Surrogate Recovery)	%	109	103			NR70
PFNA (Surrogate Recovery)	%	101	96			NR70
PFDA (Surrogate Recovery)	%	101	100			NR70
PFUdA (Surrogate Recovery)	%	87	101			NR70
PFDoA (Surrogate Recovery)	%	92	94			NR70
PFTeDA (Surrogate Recovery)	%	104	104			NR70
PFHxDA (Surrogate Recovery)	%	108	105			NR70
FOUEA (Surrogate Recovery)	%	107	88			NR70
PFBS (Surrogate Recovery)	%	100	104			NR70
PFHxS (Surrogate Recovery)	%	104	104			NR70
PFOS (Surrogate Recovery)	%	97	103			NR70
PFOSA (Surrogate Recovery)	%	84	89			NR70
N-MeFOSA (Surrogate Recovery)	%	89	83			NR70
N-EtFOSA (Surrogate Recovery)	%	86	97			NR70
N-MeFOSAA (Surrogate Recovery)	%	99	90			NR70
N-EtFOSAA (Surrogate Recovery)	%	100	89			NR70
N-MeFOSE (Surrogate Recovery)	%	123	99			NR70
N-EtFOSE (Surrogate Recovery)	%	82	86			NR70
4:2 FTS (Surrogate Recovery)	%	194	94			NR70
6:2 FTS (Surrogate Recovery)	%	166	90			NR70
8:2 FTS (Surrogate Recovery)	%	139	80			NR70
8:2 diPAP (Surrogate Recovery)	%	90	98			NR70
Dates						
Date extracted		9-NOV-2021	9-NOV-2021			
Date analysed		9-NOV-2021	9-NOV-2021			

N21/024545
to
N21/024546

PFOS and PFHxS are quantified using a combined branched and linear standard,

REPORT OF ANALYSIS

linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

Selected PFAS surrogate recoveries are biased due to matrix effects.ô
High PFAS surrogate recoveries accepted - results corrected for recovery.

N21/024546
Sample was re-analysed and re-reported as per client request.

[redacted], Analyst
Organics - NSW
Accreditation No. 198

18-NOV-2021

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) as received and tested.

This Report supersedes reports: *RN1334286*
RN1333677 *RN1333701*

Measurement Uncertainty is available upon request.
Chemical Accreditation 198: 105 Delhi Road, North Ryde, NSW, 2113

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/211104 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.05	<0.05	NA	NA	NA	92	NA
PFPeA (2706-90-3)	NR70	0.02	<0.02	NA	NA	NA	70	NA
PFHxA (307-24-4)	NR70	0.01	<0.01	NA	NA	NA	81	NA
PFHpA (375-85-9)	NR70	0.01	<0.01	NA	NA	NA	80	NA
PFOA (335-67-1)	NR70	0.01	<0.01	NA	NA	NA	79	NA
PFNA (375-95-1)	NR70	0.01	<0.01	NA	NA	NA	76	NA
PFDA (335-76-2)	NR70	0.01	<0.01	NA	NA	NA	89	NA
PFUdA (2058-94-8)	NR70	0.01	<0.01	NA	NA	NA	72	NA
PFDoA (307-55-1)	NR70	0.01	<0.01	NA	NA	NA	68	NA
PFTrDA (72629-94-8)	NR70	0.02	<0.02	NA	NA	NA	67	NA
PFTeDA (376-06-7)	NR70	0.02	<0.02	NA	NA	NA	93	NA
PFHxDA (67905-19-5)	NR70	0.02	<0.02	NA	NA	NA	76	NA
PFODA (16517-11-6)	NR70	0.05	<0.05	NA	NA	NA	53	NA
FOUEA (70887-84-2)	NR70	0.01	<0.01	NA	NA	NA	78	NA
PFBS (375-73-5)	NR70	0.01	<0.01	NA	NA	NA	80	NA
PFPeS (2706-91-4)	NR70	0.01	<0.01	NA	NA	NA	83	NA
PFHxS (355-46-4)	NR70	0.01	<0.01	NA	NA	NA	78	NA
PFHpS (375-92-8)	NR70	0.01	<0.01	NA	NA	NA	81	NA
PFOS (1763-23-1)	NR70	0.02	<0.02	NA	NA	NA	83	NA
PFNS (68259-12-1)	NR70	0.01	<0.01	NA	NA	NA	85	NA
PFDS (335-77-3)	NR70	0.01	<0.01	NA	NA	NA	76	NA
PFOSA (754-91-6)	NR70	0.01	<0.01	NA	NA	NA	78	NA
N-MeFOSA (31506-32-8)	NR70	0.02	<0.02	NA	NA	NA	75	NA
N-EtFOSA (4151-50-2)	NR70	0.02	<0.02	NA	NA	NA	72	NA
N-MeFOSAA (2355-31-9)	NR70	0.01	<0.01	NA	NA	NA	84	NA
N-EtFOSAA(2991-50-6)	NR70	0.01	<0.01	NA	NA	NA	69	NA
N-MeFOSE (24448-09-7)	NR70	0.05	<0.05	NA	NA	NA	75	NA
N-EtFOSE (1691-99-2)	NR70	0.05	<0.05	NA	NA	NA	107	NA
4:2 FTS (757124-72-4)	NR70	0.01	<0.01	NA	NA	NA	86	NA
6:2 FTS (27619-97-2)	NR70	0.01	<0.01	NA	NA	NA	99	NA
8:2 FTS (39108-34-4)	NR70	0.01	<0.01	NA	NA	NA	69	NA
10:2 FTS (120226-60-0)	NR70	0.01	<0.01	NA	NA	NA	69	NA
8:2 diPAP (678-41-1)	NR70	0.02	<0.02	NA	NA	NA	79	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed: [redacted]

[redacted]
Organics Manager, NMI-North Ryde

Date: **11/11/2021**

Appendix G

Calibration Certificate

AECOM Imagine it. Delivered.

AECOM Australia Pty Ltd
34 McLachlan Street
Darwin NT 0800
GPO Box 3175
Darwin NT 0801
Australia
www.aecom.com

[redacted] tel
fax
ABN 20 093 846 925

Equipment Information

Instrument:

Serial Number: 19G102635

Equipment Check

	Enclosed	Comment
YSI Pro Plus Display	☑	
YSI Quatro Sonde	☑	
- YSI 1001 pH Probe	☑	
- YSI 1002 ORP Probe	☑	
- YSI 5560 Cond/Temp Probe	☑	
- YSI Polarographic DO Sensor	☑	
Flow Cell & Attachments (x2)	☑	
Probe Guard	☑	
Rubber Storage/Calibration Sleeve	☑	
Calibration Cup + Cap	☑	
YSI Cable Management Kit	☑	
YSI Pro Series ProComm II Kit	☑	
User Manual + Flow Cell Manual	☑	
Spare Batteries (x2) & Screwdriver	☑	
Laminated Quick Start Guide	☑	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	☑	☐
Dissolved Oxygen	☐ 100% Saturation	±2%	☑	☐
	Pressure Compensation	____hPa	☑	☐
Conductivity	☑ 12.88mS/cm 12.90	±0.5%	☑	☐
	☑ Check linearity at 1.413mS/cm 1478	±0.5%	☑	☐
Salinity	Auto Calibrated	±1%	☐	☐
pH	☑ pH 7.00 7.20	± 0.2	☑	☐
	10 ☑ pH 9.90	± 0.2	☑	☐
	4 ☑ pH 4.20			
ORP	☐ 296 mV at 23.10 °C	±20mV	☑	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

Name: [redacted]

Signatu

Date: 1/10/21

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AECOM Australia Pty Ltd
34 McLachlan Street
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Darwin NT 0801
Australia
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[redacted] tel
fax
ABN 20 093 846 925

Equipment Information

Instrument:

Serial Number: ~~[redacted]~~ 19G102636

Equipment Check

	Enclosed	Comment
YSI Pro Plus Display	☑	
YSI Quatro Sonde	☑	
- YSI 1001 pH Probe	☑	
- YSI 1002 ORP Probe	☑	
- YSI 5560 Cond/Temp Probe	☑	
- YSI Polarographic DO Sensor	☑	
Flow Cell & Attachments (x2)	☑	
Probe Guard	☑	
Rubber Storage/Calibration Sleeve	☑	
Calibration Cup + Cap	☑	
YSI Cable Management Kit	☑	
YSI Pro Series ProComm II Kit	☑	
User Manual + Flow Cell Manual	☑	
Spare Batteries (x2) & Screwdriver	☑	
Laminated Quick Start Guide	☑	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	☑	☐
Dissolved Oxygen	☑ 100% Saturation	±2%	☑	☐
	Pressure Compensation ____hPa	NA	☐	☐
Conductivity	☑ 12.88mS/cm	±0.5%	☑	☐
	☑ Check linearity at 1.413mS/cm	±0.5%	☑	☐
Salinity	Auto Calibrated	±1%	☐	☐
pH	☐ pH 7.00 7.09	± 0.2	☑	☐
	4 ☑ pH 4.17	± 0.2	☐	☐
	10 ☑ pH ____			
ORP	☑ 225.4 mV at 23.6 °C	±20mV	☑	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

Name: [redacted]

Signatu[redacted]

Date: 1/10/21

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Equipment Information

Instrument: 451 Proseries.

Serial Number: 14161

Equipment Check

	Enclosed	Comment
YSI Pro Plus Display	☑	
YSI Quatro Sonde	☑	
- YSI 1001 pH Probe	☑	* Seems off. taking awhile to move
- YSI 1002 ORP Probe	☑	
- YSI 5560 Cond/Temp Probe	☑	
- YSI Polarographic DO Sensor	☑	
Flow Cell & Attachments (x2)	☑	
Probe Guard	☑	
Rubber Storage/Calibration Sleeve	☑	
Calibration Cup + Cap	☑	
YSI Cable Management Kit	☑	
YSI Pro Series ProComm II Kit	☑	
User Manual + Flow Cell Manual	☑	
Spare Batteries (x2) & Screwdriver	☑	
Laminated Quick Start Guide	☑	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	☑	☐
Dissolved Oxygen	☐ 100% Saturation	±2%	☑	☐
	Pressure Compensation ____hPa		☑	☐
Conductivity	☑ 12.88mS/cm 12.86	±0.5%	☑	☐
	☑ Check linearity at 1.413mS/cm 1430	±0.5%	☑	☐
Salinity	Auto Calibrated	±1%	☑	☐
pH	☐ pH 7.00 ~5.77 very slow.	± 0.2	☐	☒ Use other YSI
	☑ pH 4.0	± 0.2	☐	☐
	☑ pH 10.0			
ORP	☑ 154 mV at 22.8°C	±20mV	☑	☐

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

Name: [redacted]

Signature [redacted]

Date: 08-11-2021

Prepared for
Department of Defence Directorate of PFAS Investigations and Remediation
ABN: 68706814312

AECOM

Wet Season Sampling Event Factual Report 2022

PFAS OMP - Robertson Barracks

16-Jan-2023
Robertson Barracks
Doc No. 20200323_OMP001

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Wet Season Sampling Event Factual Report 2022

PFAS OMP - Robertson Barracks

Client: Department of Defence Directorate of PFAS Investigations and Remediation

ABN: 68706814312

Prepared by

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16-Jan-2023

Job No.: 60612561

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document	Wet Season Sampling Event Factual Report 2022
Ref	60612561_1200_ROB_Factual Report_2022_Rev0.docx
Date	16-Jan-2023
Prepared by	[redacted]
Reviewed by	[redacted]

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	16-Jan-2023	Final	[redacted] Principal Environmental Scientist	[redacted]

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Abbreviations

Term	Description
AECOM	AECOM Australia Pty Ltd
ALS	Australian Laboratory Services Pty Ltd
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure Amended 2013
BOM	Bureau of Meteorology
DCMM	Defence Contamination Management Manual
Defence	Department of Defence
DIA	Darwin International Airport
DO	Dissolved oxygen
DoH	Department of Health
EC	Electrical conductivity
FSANZ	Food Standards Australia and New Zealand
HEPA	Heads of Environmental Protection Authority Australia and New Zealand
km	Kilometre
L	Litre
LOR	Limit of reporting
mAHD	metres Australian Height Datum
mbtoc	metres below top of casing
m	Metre
mg/L	Milligrams per Litre
mm	Millimetres
mV	Millivolts
µg/L	Micrograms per Litre
µS/cm	Micro siemens per centimetre
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan
NHMRC	National Health and Medical Research Council
NMI	National Measurement Institute
NT	Northern Territory
NTU	Nephelometric Turbidity Unit
NSW	New South Wales
OMP	Ongoing Monitoring Plan
ORP	Oxidation-reduction potential
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid

Term	Description
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
QA/QC	Quality Assurance/Quality Control
QLD	Queensland
RAN	Royal Australian Navy
SAQP	Sampling and Analysis Quality Plan
SWL	Standing Water Level

1.0 Introduction

1.1 General

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) outlined in the *PFAS Management Area Plan (PMAP)* (Department of Defence, 2018) at Robertson Barracks (the 'Site') in the Northern Territory. The location of the Site and Monitoring Area is shown in **Figure 1** in **Appendix A**. The Monitoring Area includes areas on-Base and off-Base.

The OMP (Department of Defence, 2018) for the Site includes the following sampling events:

- biannual groundwater event in the late dry season and late wet season
- early wet season "first flush" surface water event
  - nominally after 100mm of rainfall
- late wet season surface water event
- annual late wet season sediment event.

The sampling and analysis quality plan (SAQP) (AECOM, 2021) provides details of the sampling events.

The primary purpose of the OMP is to monitor changes to the PFAS impact in groundwater, surface water and sediment pathways associated with sources of PFAS as initially assessed through the detailed site investigation phase of works. Changes may result from the specific or cumulative impact of remediation or containment actions, existing transportation trends, and changes to hydrogeology or weather events.

This sampling event factual report has been prepared to report the results of the 2022 Wet Season Sampling Events, which was completed between January and April 2022

This report has been prepared in accordance with the *PFAS OMP Factual Report Guidance,* v0.2, May 2021 (Department of Defence, 2021).

1.2 Objectives

As noted above, the objective of the PFAS OMP is to provide information on changes to PFAS contamination originating from Defence property to inform risk management decisions by Defence to protect human health and the environment.

The purpose of this PFAS OMP factual report is to summarise the scope of works and findings for January 2022 and April 2022 sampling events, conducted in accordance with the SAQP (AECOM, 2021).

This report has been prepared in accordance with the *PFAS OMP Factual Report Guidance,* v0.2, May 2021 (Department of Defence, 2021).

An annual interpretive report will be subsequently developed for the purpose of assessing the data collected during the discrete monitoring events completed over the preceding 12-month period (May 2021 through April 2022) and will include assessment of environmental variability and any statistically significant trends in PFAS concentrations.

2.0 Scope of work

The sampling event was completed in general accordance with the SAQP (AECOM, 2021).

Prior to commencement of the sampling events, the SAQP (AECOM, 2021), was reviewed to ensure compliance with the following:

- the OMP (Department of Defence, 2018)
- PFAS National Environmental Management Plan (NEMP) (HEPA, 2020)
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (ASC NEPM, 2013)
- Defence Routine Environment Water Quality Monitoring Manual (Department of Defence, 2019a)
- AS/NZ 5667:1998 Water quality – Sampling (AS/NZS, 1998)
- Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality (ANZG, 2018)
- relevant Territory regulatory guidelines.

In summary, the scope of works for these sampling events, conducted during the wet season months of January 2022 and April 2022, included:

- January 2022
  - surface water sampling event consisting of the collection of 9 surface water samples from 9 of the 9 planned sampling locations (refer to **Table 2** below, and **Figure 2** in **Appendix A** for specific locations)
- April 2022
  - groundwater sampling event consisting of the collection of 18 groundwater samples (including gauging of groundwater levels, where appropriate) from existing monitoring wells using Hydrasleeves™ (refer to **Table 1** below, and **Figure 1** in **Appendix A**, for specific locations)
  - surface water sampling event consisting of the collection of 7 surface water samples from 7 of the 9 planned sampling locations (refer to **Table 2** below, and **Figure 3** in **Appendix A** for specific locations). Two locations were dry therefore unable to be collected from those locations during this sampling event
  - sediment sampling event consisting of the collection of 9 sediment samples from 9 of the planned sampling locations (refer to **Table 3** below, and **Figure 4** in **Appendix A** for specific locations)
- May 2022
  - Re-sampling of groundwater location MW024 to confirm PFAS concentrations
- sollection of intra- and inter-laboratory duplicate samples at a rate of 1 in 10 primary samples, one rinsate and one field blank sample per fieldwork day for groundwater, surface water and sediment
- analysis of all samples for a suite of 28 PFAS analytes at the standard limit of reporting (LOR)
- data management of the OMP field and laboratory data in the Defence ESdat database
- preparation of this Sampling Event Factual Report

2.1 Planned monitoring locations

The monitoring locations outlined within the SAQP (AECOM, 2021) for the OMP groundwater, surface water and sediment sampling events are tabled below, with deviations from the planned sampling included in Section 2.2:

Table 1 Groundwater sampling locations

Area	Description	Sampling locations	Number of wells/ bores	Number of wells/bores sampled	Sampled/ Total
On Site	Northeastern Boundary of site	MW034	1	1	8/8
	Source Area 1	MW066	1	1	
	Source Area 2	MW004, MW004D	2	2	
	Up gradient Source Area 1	MW012, MW012D	2	2	
	Up gradient Source Area 2	MW080	1	1	
	Down gradient Source Area 2 and 3	MW001	1	1	
Off Site	Thorngate Road – Northern Boundary	MW032	1	1	10/10
	Down gradient Source Area 1	MW023*	1	1	
	Across gradient Source Area 1	MW021, MW021D	2	2	
	Down gradient Source Are 2	MW018, MW031	2	2	
	Down gradient of Source Area 2 and 3	MW029, MW030	2	2	
	Shoal Bay Receiving Station (SBRS) Abstraction bores	MW112, MW113	2	2	
	* Contingency location MW024 sampled in lieu				

Table 2 Surface water sampling locations

Area	Description	Sampling locations	Number of Locations	Number of locations sampled	Sampled/ Total
On Site	On-base drainage line, Southeast boundary	SW001	1	1	3/5
	On-base drainage line, Southwest boundary	SW007	1	1	
	On-base drainage line, Central	SW023*, SW028*	2	0	
	On-base drainage line, Eastern boundary	SW059	1	1	
Off Site	Northern Drainage Line	SW123	1	1	4/4
	Milner's Creek	SW086, SW091	2	2	
	Southern Drainage Channel	SW075	1	1	

*Location not sampled during April 2022 event. Refer to **Table 4** and **Table 10** for further details

Table 3 Sediment sampling locations

Area	Description	Sampling Locations	Number of Locations	Number of locations sampled	Sampled/ Total
On Site	On-base drainage line, Southeast boundary	SD001	1	1	5/5
	On-base drainage line, Southwest boundary	SD007	1	1	
	On-base drainage line, Central	SD023, SD028	2	2	
	On-base drainage line, Eastern boundary	SD059	1	1	
Off Site	Northern Drainage Line	SD123	1	1	4/4
	Milner's Creek	SD086, SD091	2	2	
	Southern Drainage Channel	SD075	1	1	

2.2 Deviations from the SAQP

The works completed during the January 2022 sampling event was completed in accordance with the SAQP and did not have any deviations. The works completed during the April 2022 sampling event included some deviations from the SAQP (AECOM, 2021) as outlined in **Table 4** below.

Table 4 Deviations from the SAQP during sampling events 2022

SAQP	April 2022 Sampling Events	Impact on OMP
Nine surface water (on-base) locations are identified to be sampled as part of the end of the wet season sampling event.	During April 2022 monitoring event, seven of nine locations were sampled, with locations SW028 and SW023 being dry for the duration of the sampling event.	Data gap. Not collecting from the two surface water sampling locations results in a minor data gap. Surface water samples were collected from down gradient locations which monitor PFAS mobilisation in surface water from up gradient locations reducing the impact of the lost data.
18 Groundwater (on- and – off- Base) locations are identified to be sampled as part of the end of wet season sampling event.	During April 2022 groundwater monitoring location MW023 was unable to be sampled – location was noted to have damaged casing by the asbestos removal activities on Base. Contingency location MW024 was sampled instead.	No material impact on dataset due to alternative location being sampled.
Not specified	Resampling of MW024 to confirm whether or not a QC sample that returned with a detection of PFAS	No impact. It is suspected the reported PFAS concentration was the result of either a lab error or cross contamination

SAQP	April 2022 Sampling Events	Impact on OMP
	was either a lab or sample collection error.	issue as PFAS is not anticipated in this sampling location. As such, the location was resampled to reanalysed to confirm whether PFAS was present in the well or if there was another reason for the detection. As the second sample returned results below the LOR, it is believed that it was an error of some kind and not the result of PFAS being present in this location.

3.0 Sampling methodology

The methodology adopted for the annual sediment sampling and biannual groundwater and surface water sampling events during January and April 2022 was in general accordance with the SAQP (AECOM, 2021) (noting that changes/deviations are captured in **Section 2.2**) and is summarised below:

Table 5 Sampling methodology

Item	Details
Groundwater and surface water sampling methodology	
Groundwater gauging	Where accessible, the depth to groundwater was measured in each monitoring well within a 24-hour period, and then again immediately prior to collection of groundwater samples using an interface probe.
Field parameters	Where appropriate, groundwater and surface water field parameters were recorded ex-situ and in-situ, respectively, using a YSI Pro Water Quality Meter. Parameters recorded consisted of the following: temperature (°C), electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP) and pH. Observations of odour, colour and clarity (turbidity) of groundwater and surface water was recorded at each site.
Water sampling methodology	Groundwater samples were collected from all accessible wells using no-purge methodology HydraSleeves™, which were installed within the screened interval of the wells for a minimum of 24 hours prior to sampling. HydraSleeve™ placement was based on a review of the well construction logs. Once sampling was completed, new HydraSleeves™ were redeployed within the screened interval in preparation for the next sampling round. Two wells, MW112 and MW113, were sampled using the installed pumps by collection of a grab sample from the taps. Surface water samples were collected from either mid-way through the water column or approximately 0.5 m below the surface (if possible) with care taken to minimise collection of sediment or floating materials in the samples. At each location, laboratory supplied bottles were lowered into the water using an aluminium sampling pole, with the cap immediately applied once the container was full and retrieved from the water.
Sediment sampling methodology	Sediment samples were collected at the sediment/water interface approximately between 0.0 mbgl and 0.1 mbgl. At locations where water was present in creeks and drains a lab supplied HDPE-free soil jar was lowered into the water body using a stainless-steel sampling pole and nitrile gloves. The sediment was collected directly into the jars until sampling jar capacity was met. Jar lids were secured immediately upon completion of filling each jar. Decontamination of field equipment occurred prior to and following each sediment location.
QAQC samples	Field QA/QC samples collected included intra-laboratory duplicate and inter-laboratory duplicate samples and rinsate samples. Refer to **Appendix D** for assessment of QAQC sample data.
Sample analysis	Samples were submitted to the primary and secondary laboratories for analysis. ALS Environmental (ALS) Sydney, NSW was used as the primary laboratory. The National Measurement Institute (NMI) of Sydney, NSW was used as the secondary laboratory. ALS and NMI methods for analyses were certified by the National Association of Testing Authorities (NATA). Laboratory certificates are presented in **Appendix F**

3.1 Adopted Screening Criteria

Screening criteria were selected on the basis of national guidance in the form of the PFAS National Environmental Management Plan, Defence estate and environmental strategies, and Defence PFAS-specific strategies and guidance. Guidance documents used to assess the dataset includes the following:

- Department of Health (DoH) Health Based Guidance Values for PFAS for use in site investigations in Australia (Department of Health, 2019)
- Heads of the Environment Protection Authority (HEPA), PFAS National Environmental Management Plan (NEMP) (HEPA, 2020)
- National Health and Medical Research Council (NHMRC), Guidance on PFAS in Recreational Water (NHMRC, 2019)

The adopted screening criteria which have been adopted for groundwater and surface water are presented **Table 6**.

Table 6 Summary of adopted screening criteria for groundwater and surface water.

Pathway	Compound	Criteria	Comment/Reference
Human health receptors			
Drinking water - groundwater	PFOS (Perfluorooctane sulfonate) + PFHxS (Perfluorohexane sulfonic acid)	0.07 µg/L	These values are from the PFAS NEMP (HEPA, 2020). *All groundwater results will be compared to these criteria.*
	PFOA (Perfluorooctanoic acid)	0.56 µg/L	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	These values are from Guidance on PFAS NEMP (HEPA, 2020). *All surface water results will be compared to these criteria.*
	PFOA	10 µg/L	
Ecological receptors			
Freshwater (99% species protection values)	PFOS	0.00023 µg/L	These values are from the PFAS NEMP (HEPA, 2020). The 99% level of protection has been applied for slightly to moderately disturbed ecosystems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. For the purposes of preliminary screening of analytical water results, the laboratory LOR will be adopted rather than sole use of the criteria value. *All surface water and groundwater results will be compared to these criteria.*
	PFOA	19 µg/L	

3.2 Data quality objectives and data validation

The data quality objectives (DQOs) and data quality indicators (DQIs) adopted for these works are presented in the SAQP (AECOM, 2021).

Data validation assessment is provided in **Appendix D**.

Key findings from the data validation were as follows:

The potential exists for concentrations of Perfluorooctane sulfonate (PFOS) to be below the LOR (0.01 µg/L), but above the adopted guideline value (0.00023 µg/L) and this should be taken into consideration when interpreting results. Specific locations meeting this criteria can be found in the analytical tables located in Appendix B.

- Data validation procedures employed in the assessment of the field and laboratory QA/QC data are indicative that the overall quality of the analytical data produced is acceptably reliable for the purpose of this report. An examination of sampling analysis data compared to the data validation findings did not result in any results that required flagging for potential inaccuracies.

All data collected during this event has been reviewed and uploaded to the Defence ESdat database in accordance with Defence Contamination Management Manual (DCMM) (Department of Defence, 2019b) Annex L requirements. Additionally, the interlaboratory duplicate from MW024 had a reported concentration of PFAS at the LOR, whereas the primary and intra-laboratory samples were reported below the LOR. Concentrations of PFAS are not anticipated in this sampling location, and since the primary and intra-laboratory duplicate sample reported no PFAS concentrations at or above the LOR, it was suspected that the interlaboratory reported result was either a lab error or a sampling error that led to cross-contamination. Resampling was conducted to confirm whether PFAS was in this sampling location or not. Reanalysis confirmed that there is no detectable PFAS in this location and suggests the previously reported PFAS concentration was either a lab or a sample collection error.

4.0 Field observations and results

4.1 General field observations

Field data was collected on data forms and the data was uploaded into ESdat for development of report tables. Field data tables are presented in **Appendix C.** The following field observations were applicable across the entirety of the January and April 2022 sampling events.

Table 7 General field observations

Item	Observation
Weather conditions (January 2022)	Weather in general was observed to be partly cloudy, 24.5 - 31.9 °C and high humidity during the sampling event. Rainfall was recorded at the nearest rain gauging station (Darwin airport) on 20 January with 23.2 mm of rain recorded. (Darwin airport weather station, 014015) (Bureau of Meteorology, 2022).
Weather conditions (April 2022)	Weather in general was observed to be partly cloudy, 25.8 - 35.2 °C and moderate to high humidity during the sampling event. Rainfall was recorded at the nearest rain gauging station (Darwin airport) on 19, 20, 21, 22 and 26 of April with 5.8 mm recorded across all five days. (Darwin airport weather station, 014015) (Bureau of Meteorology, 2022).
Estate Management Works or Training Activities	During the sampling event, no notable estate works, or training activities were observed in the vicinity of sampling locations.

4.2 Groundwater

4.2.1 Field observations and field measurements

Table 8 Groundwater observations and field measurements

Item	Observations and field measurements
Fieldwork Dates	The groundwater sampling was completed between 19 and 26 April 2022. Re-sampling of MW024 was completed on the 30 May 2022.
Access and Sample Collection	All monitoring wells and bores were accessible and sampled with the exception of MW023 which was damaged and unable to be sampled. The contingency location MW024 was sampled instead of MW023. Wells MW112 and MW113 was sampled from the fitted taps.

Item	Observations and field measurements
Monitoring Well Network Condition	Monitoring wells MW066 has a broken gatic lid and is scheduled for repair in the 2022 dry season. Monitoring well MW023 was damaged during recent excavation activities near the well and is scheduled for repair in the 2022 dry season.
Field Observations	Low to moderate turbidity with brown colouration was observed in most locations, with the exception of extraction bores MW012 and MW113, which had clear colourless water.
Depth to Groundwater and flow direction	Depth to groundwater was recorded from 16 of 18 wells visited (all other than the two wells sampled via taps), ranging from 0.809 (MW030) to 5.083 (MW012D) metres below top of casing (m btoc). Groundwater elevations in the Upper Bathurst Island Formation aquifer were calculated to be between 4.852 (MW024) and 27.278 (MW012) metres Australian Height Datum (m AHD). Groundwater gauging data is presented in **Table B1** in **Appendix B**. Inferred groundwater contours and groundwater flow directions at the site in April 2022 are shown on **Figure 5** in **Appendix A**. Inferred groundwater contouring suggests that groundwater in the Upper Bathurst Island Formation aquifer unit drains east and northeast towards Millner's Creek.
Geochemical Parameters	Groundwater geochemical parameters were measured during sample collection from the HydraSleeve™ (or from the grab samples obtained from the taps) using a decontaminated YSI cup and YSI Pro Water Quality Meter. The readings are presented in **Table B1** in **Appendix B**, and are summarised below: DO ranged from 0.78 mg/L (MW080) to 8.34 mg/L (MW018). EC ranged from 73.4 µS/cm (MW012) to 693.0 µS/cm (MW024) indicating a relatively low salinity. pH ranged from 4.20 pH units (MW066) to 6.82 pH units (MW113) indicating slightly acidic to neutral conditions. ORP (corrected) ranged from -74.2 mV (MW112) to 154.2 mV (MW066) indicating oxidising to reducing conditions. The YSI water quality meter was calibrated once during the field event and checked for accuracy using calibration solution twice per day during the field event (refer Appendix G).

4.2.2 PFAS groundwater analytical results

During this sampling event, 7 of the 18 groundwater locations sampled reported concentrations of PFAS above the laboratory LOR.

There were no first-time detections above the LOR and no new exceedances of human health or ecological criteria for PFOS, PFOS+PFHxS or PFOA in groundwater at any groundwater monitoring locations, with the exception of inter-laboratory duplicate, 1200_QC200_220420 that was collected at MW024 and reported concentrations of PFAS equal to the LOR (0.01 µg/L). Re-sampling of this location was completed on the 30 May 2022 to confirm results, which came back below LOR. Concentrations of PFAS are not anticipated in this sampling location, and since the primary and intra-laboratory duplicate sample reported no PFAS concentrations at or above the LOR, it was suspected that the interlaboratory reported result was either a lab error or a sampling error that led to cross-contamination. Resampling was conducted to confirm whether PFAS was in this sampling location or not. Reanalysis confirmed that there is no detectable PFAS in this location and suggests the previously reported PFAS concentration was either a lab or a sample collection error.

The PFAS groundwater analytical results from the April 2022 sampling event are presentedin **Table B2** in **Appendix B** and groundwater monitoring locations on **Figure 1** in **Appendix A.**

4.3 Surface water- January event

4.3.1 Field observations and field measurements

Table 9 Surface water observations and field measurements

Compound	Criteria
Fieldwork Dates	Surface water sampling was completed on 20 January 2022.
Access and Sample Collection	All surface water sampling locations were accessible or able to be sampled.
Contamination Observations	No obvious visible signs of contamination were observed.
Surface Water Flow	All off-Base surface water bodies (including the Close Training Area) had observable flow. On-Base drainage locations had moderate flow.
Geochemical Parameters	Surface water geochemical parameters were measured prior to collecting surface water samples in January 2022. The stabilised readings are presented in **Table B3** in **Appendix B**, and are summarised below: Dissolved oxygen ranged from 2.92 mg/L (SW123) to 7.38 mg/L (SW007) indicating moderate to well oxygenated conditions. Electrical conductivity ranged from 5.6 µS/cm (SW028) to 45.3 µS/cm (SW001) indicating freshwater conditions. Calculated Total Dissolved Solids (TDS) ranged from 3.6 mg/L to 29.4 mg/L from SW028 and SW001, respectively. pH ranged from 5.58 pH units (SW001) to 6.85 pH units (SW086) indicating slightly acidic to neutral conditions. Redox ranged from 109.0 mV (SW086) to 211.3 mV (SW059) indicating oxidising conditions.

4.3.2 PFAS surface water analytical results

During the sampling event 4 of the 9 surface water locations sampled reported concentrations of PFAS above the laboratory LOR.

There were no first-time detections above the LOR and no new exceedances of human health or ecological criteria for PFOS, PFOS+PFHxS or PFOA in any of the surface water monitoring locations.

The PFAS surface water analytical results from the January 2022 sampling event are presented in **Table B4** in **Appendix B** and spatially on **Figure 2** in **Appendix A**.

4.4 Surface water- April event

4.4.1 Field observations and field measurements

Table 10 Surface water observations and field measurements

Compound	Criteria
Fieldwork Dates	Surface water sampling was completed on 21 April 2022.
Access and Sample Collection	All surface water sampling locations were accessible or able to be sampled with the exception of the following: Surface water samples were not collected from locations SW023 and SW028 due to the locations being dry.
Contamination Observations	No obvious visible signs of contamination were observed.

Compound	Criteria
Surface Water Flow	All off-Base surface water bodies (including the Close Training Area) had observable flow. On-Base drainage locations had minor to moderate flow, in some cases only pools were available to sample from. Two on-Base locations, SW023 and SW028, were completely dry.
Geochemical Parameters	Surface water geochemical parameters were measured prior to collecting surface water samples in April 2022. The stabilised readings are presented in **Table B5** in **Appendix B**, and are summarised below: Dissolved oxygen ranged from 2.53 mg/L (SW001) to 4.47 mg/L (SW086) indicating moderate conditions. Electrical conductivity ranged from 49.2 µS/cm (SW123) to 246.7 µS/cm (SW001) indicating freshwater conditions. Calculated Total Dissolved Solids (TDS) ranged from 32.0 mg/L to 160.4 mg/L from SW123 and SW001, respectively. pH ranged from 5.43 pH units (SW075) to 6.68 pH units (SW086) indicating slightly acidic to neutral conditions. Redox ranged from 58.2 mV (SW086) to 105.2 mV (SW059) indicating oxidising conditions.

4.4.2 PFAS surface water analytical results

During the sampling event 4 of the 7 surface water locations sampled reported concentrations of PFAS above the laboratory LOR.

There were no first-time detections above the LOR and no new exceedances of human health or ecological criteria for PFOS, PFOS+PFHxS or PFOA in any of the surface water monitoring locations.

The PFAS surface water analytical results from the April 2022 sampling event are presented in **Table B6** in **Appendix B** and spatially on **Figure 3** in **Appendix A**.

4.5 Sediment

4.5.1 Field observations and field measurements

Table 11 Sediment observations and field measurements

Compound	Criteria
Fieldwork Dates	Sediment sampling was completed on 20 and 21 April 2022.
Access and Sample Collection	All sediment sampling locations were accessible or able to be sampled during the April sampling event
Contamination Observations	No obvious visible signs of contamination were observed.
Geochemical Parameters	Physical sediment characteristics were noted and are presented in **Table B7** in **Appendix B**, and are summarised below: • Sediment colour ranged from greys to browns • Sediment matrix consisted mostly of sand with gravels and • Sediment was generally odourless.

4.5.2 PFAS sediment analytical results

The PFAS sediment analytical results from the April 2022 sampling event are presented in **Table B8** in **Appendix B** and spatially on **Figure 4** in **Appendix A**.

There were no first-time detections above the LOR and no new exceedances of human health or ecological criteria for PFOS, PFOS+PFHxS or PFOA in any of the sediment monitoring locations.

5.0 Summary and next sampling events

5.1 Summary of monitoring event

The annual and bi-annual monitoring events were completed at the Site and publicly accessible land within the Management Area during two separate sampling events, at the start of the wet season on 20 January 2022 and during the end of the wet season between 19 and 26 April, 2022. The program included of the following:

- surface water was sampled from 9 of a planned 9 locations (January 2022)
- groundwater was sampled from 18 of a planned 18 monitoring wells (April 2022)
- surface water was sampled from 7 of a planned 9 locations (April 2022)
- sediment was sampled from 9 of a planned 9 locations (April 2022).

Of the 18 groundwater monitoring wells sampled, one was a contingency well.

The findings of the January and April 2022 sampling events and the recommended actions are summarised in **Table 12** below.

Table 12 Summary of Sampling Event

Item	Comment	Recommended Actions
Access to sampling locations	Monitoring well MW023 was damaged. Surface water samples were not collected from locations SW023 and SW028 due to the locations being dry. All sediment sample locations were accessible.	Contingency well MW024. utilised instead of MW023 until MW023 can be repaired. Additional attempts should be made to collect surface water samples from SW023 and SW028. Ongoing monitoring in accordance with the OMP.
Monitoring network condition	The flush mount cover of monitoring well MW066 remains damaged with the cover cracked in half. The monitoring well J-cap is present, in good condition and appears to be preventing surface water from mixing with groundwater. Monitoring well MW023 was damaged. All surface and sediment sampling locations were accessible and appropriate for sampling.	Replacement of the flush mount cover is planned for late dry season 2022. Contingency well MW024 was sampled instead of MW023 and will continue to be used until repaired.
Analytical Results	PFAS concentrations were recorded above the LOR at 6 of 18 monitoring well locations sampled, 4 of 9 surface water locations sampled in January 2022 and 4 of 7 surface water locations sampled in April 2022. PFAS concentrations were recorded above the LOR in 5 of 9 sediment locations sampled in April 2022.	Ongoing monitoring in accordance with the OMP.
New exceedance of NEMP drinking water	No New exceedance of the NEMP drinking water guideline for Sum of	Ongoing monitoring in accordance with the OMP.

Item	Comment	Recommended Actions
guideline values in groundwater	PFHxS + PFOS during the April-May 2022 sampling event.	
First-time detection of PFAS in groundwater	There were no first-time detections of PFAS values above the LOR in groundwater during the April-May 2022 sampling event.	Ongoing monitoring in accordance with the OMP.
New exceedance of NEMP recreational guideline values in surface water	No New exceedance of the NEMP recreational guideline for Sum of PFHxS + PFOS or PFOA during the January and April 2022 sampling event.	Ongoing monitoring in accordance with the OMP.
First-time detection of PFAS in groundwater	There were no first-time detections of PFAS values above the LOR in surface water during the January and April 2022 sampling event.	Ongoing monitoring in accordance with the OMP.
New exceedance of NEMP drinking water guideline at abstraction bores at SBRS Facility	There were no new exceedances of the NEMP drinking water guideline for Sum of PFHxS + PFOS in groundwater collected from abstraction bores from the SBRS facility during the January and April 2022 sampling event.	Ongoing monitoring in accordance with the OMP.

5.2 Upcoming Sampling Events

The next groundwater sampling event is scheduled for October 2022 and will be summarised in an End of Wet Season Sampling Factual Report in late 2022, and the next surface water sampling event is scheduled when the first significant rains are recorded at the Site between November 2022 and January 2023 and will be summarised in a Wet Season Sampling Factual Report in early 2023. First significant rains are considered a rain event of greater than 100mm of rainfall.

5.3 Upcoming Annual Interpretive Report

The third annual interpretive report is scheduled to be delivered in July 2022 and will cover the sampling events between May 2021 to April 2022.

6.0 References

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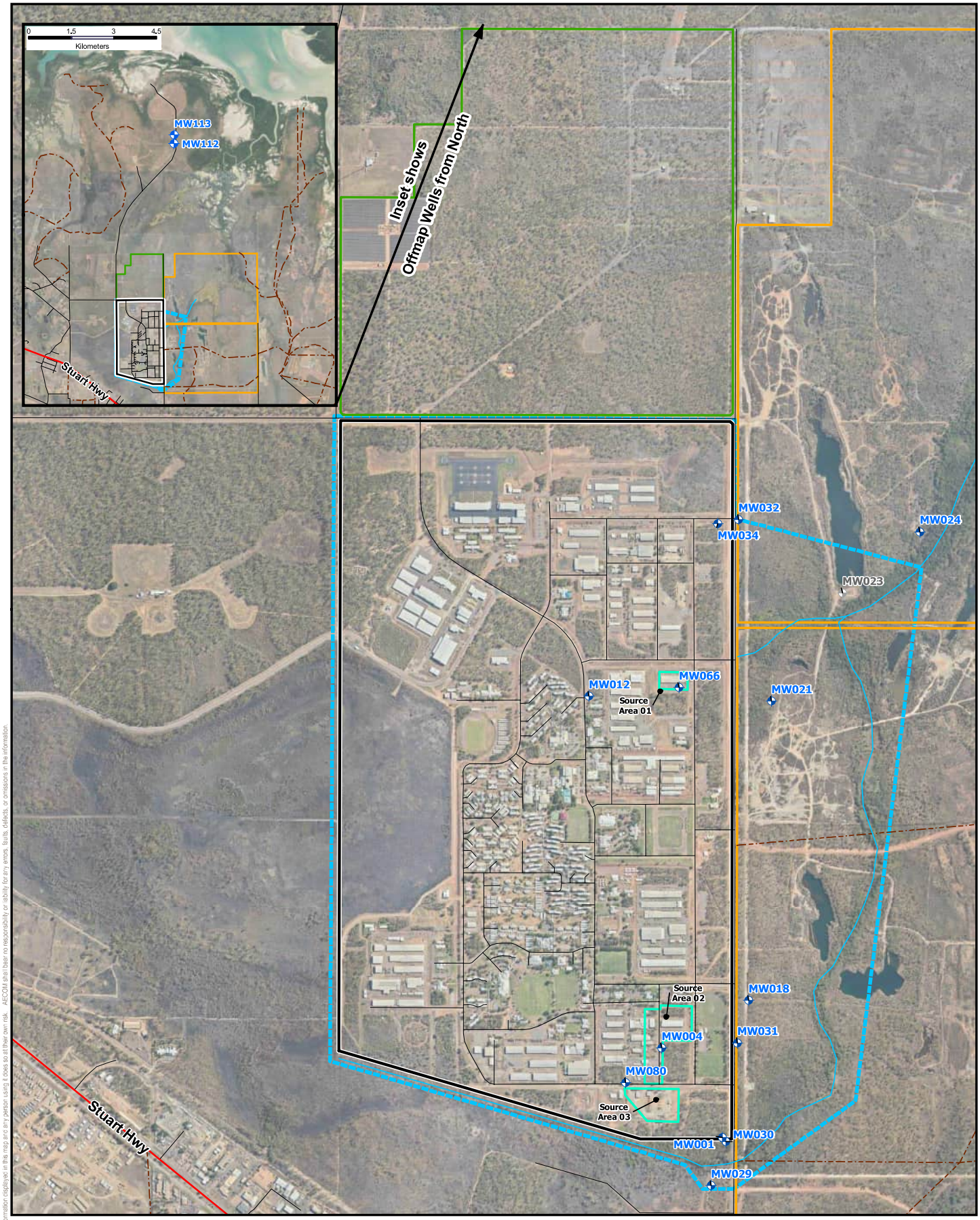
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Appendix A

Figures



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LEGEND

- Groundwater Monitoring Locations
- Groundwater Monitoring Locations - Dry
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence

Robertson Barracks Groundwater Sampling Locations

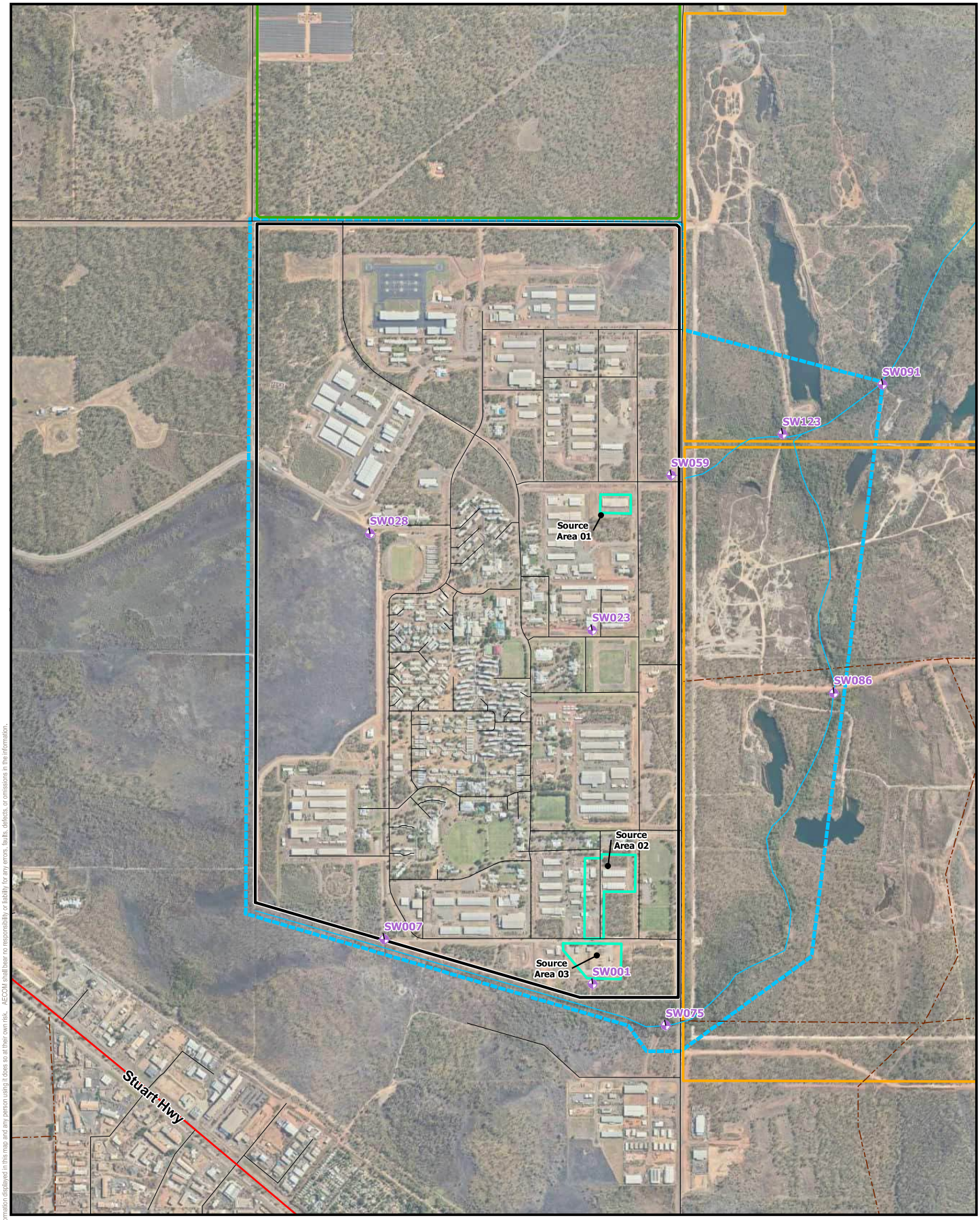
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LAST MODIFIED	[redacted]
VERSION:	1

Figure 1

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LEGEND

- Surface Water Locations
- Monitoring Area
- Source Area
- **Site Layout**
  - Robertson Barracks
  - Close Training Area
  - Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence

Robertson Barracks
Surface Water Sampling Locations

January 2022 Sampling Event

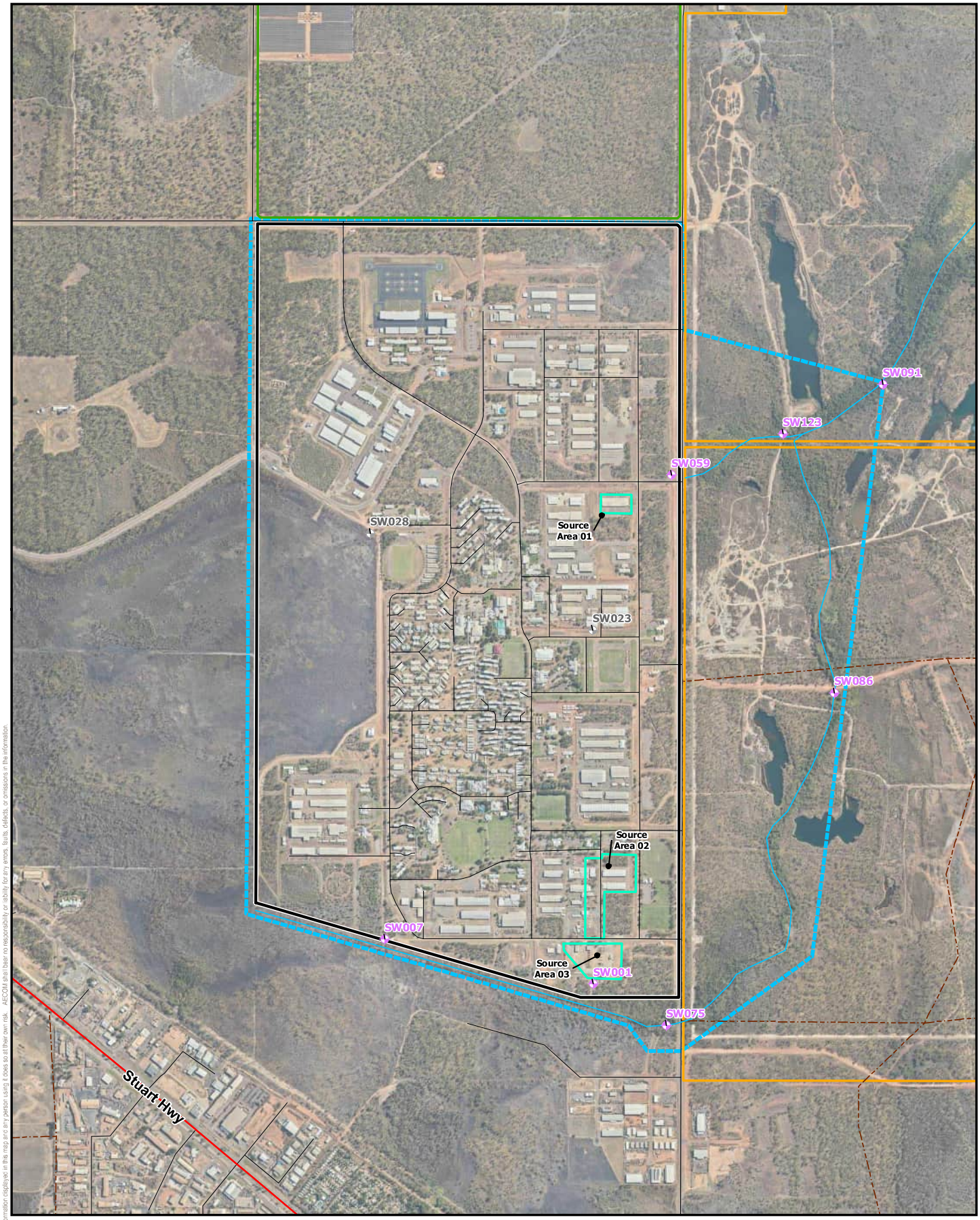
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Figure 2

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LEGEND

- Surface Water Locations
- Dry Surface Water Locations
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence

Robertson Barracks
Surface Water Sampling Locations

April 2022 Sampling Event

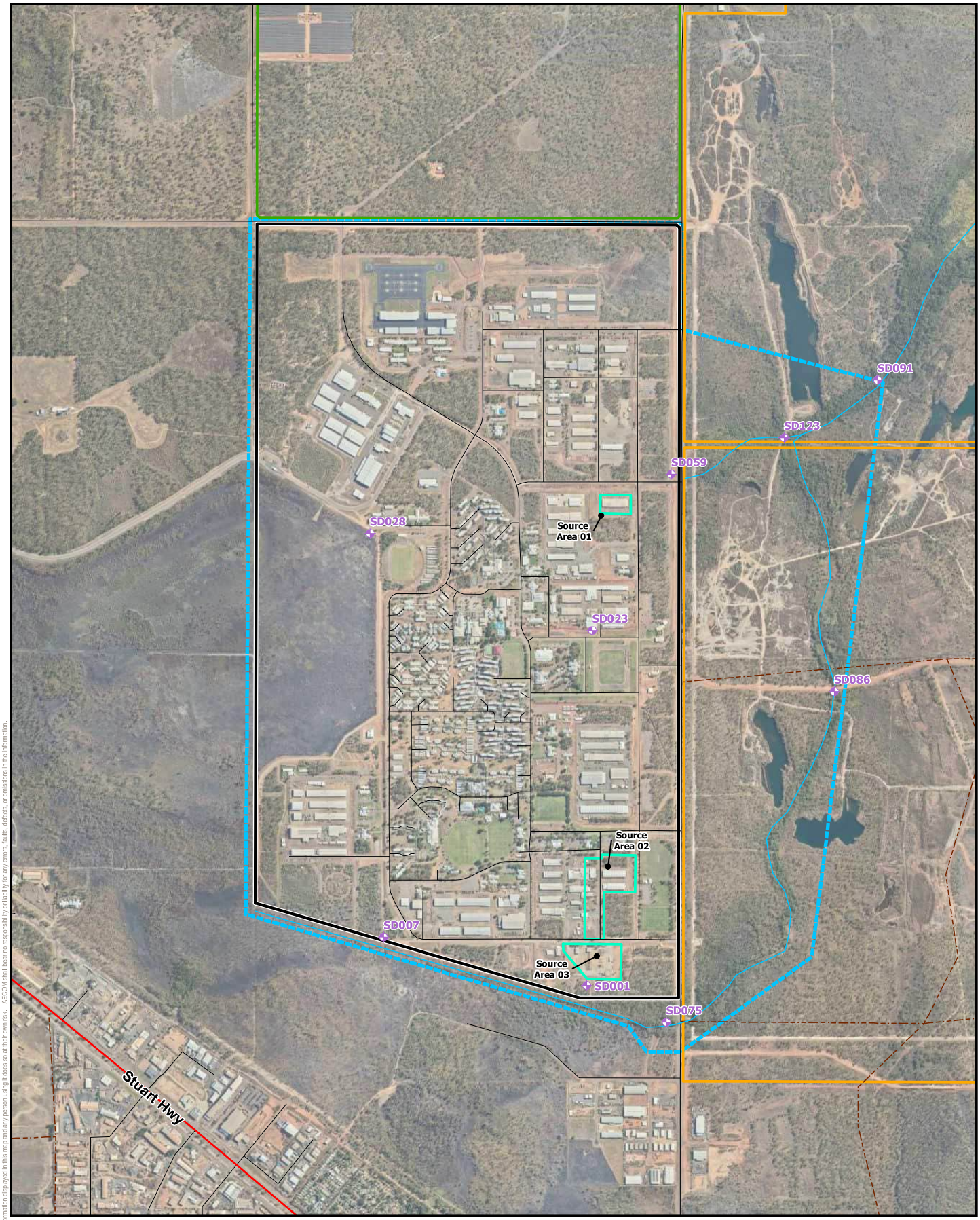
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Figure 3

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LEGEND

- Sediment Sampling Locations
- Monitoring
- Source

Site Layout

- Robertson Barracks
- Close Training
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence

Robertson Barracks
Sediment Sampling Locations

April 2022 Sampling Event

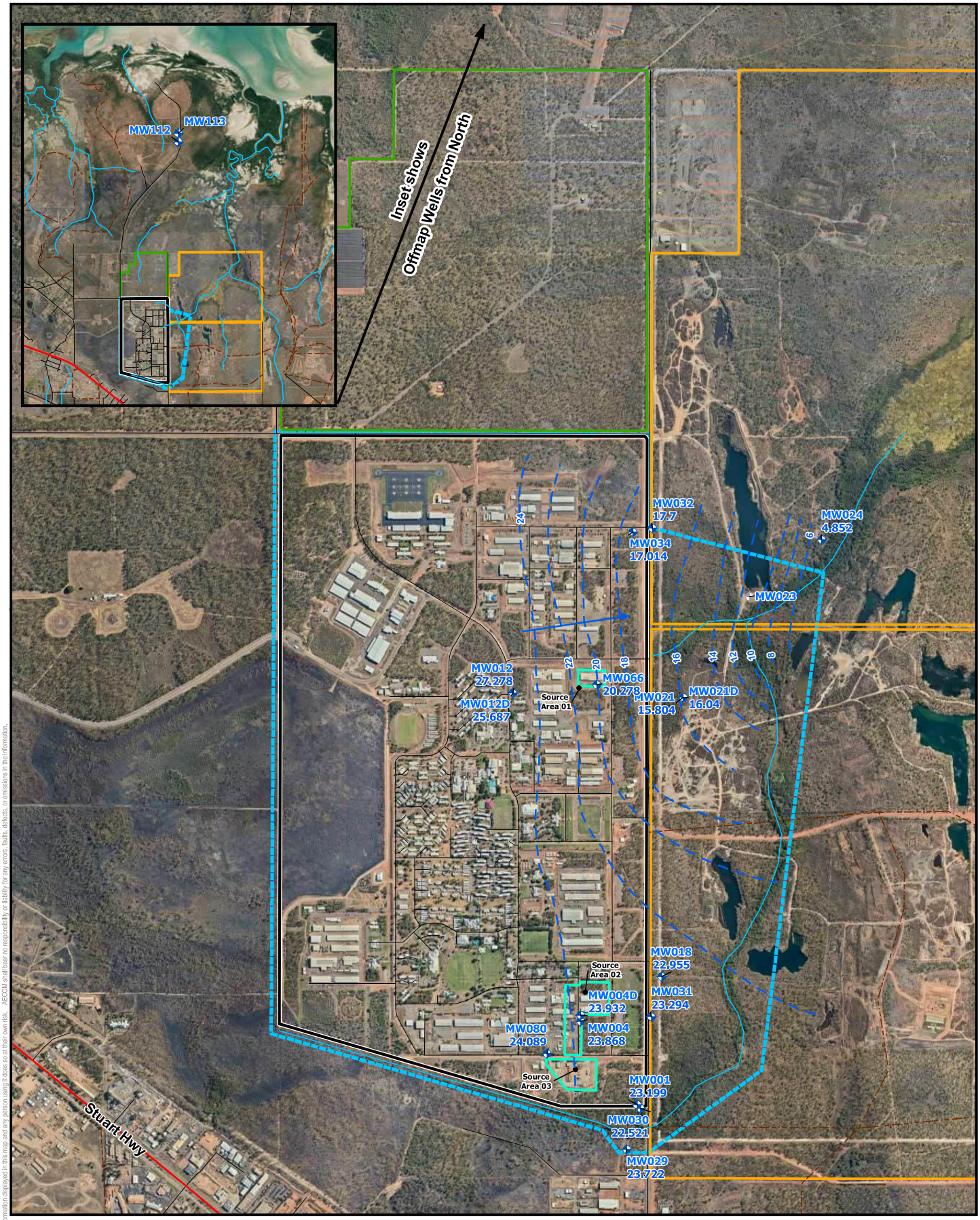
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VERSION:	

Figure 4

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LEGEND

- Groundwater Monitoring Locations
- Dry/Damaged/Blocked Locations
- 175.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level
- Inferred Flow Direction
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence

Robertson Barracks
Inferred Groundwater Contours

April 2022 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	
VERSION:	1

Figure 5

Filename: D:\Legacy\Projects\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Q2_2022\60612561_F05_RobertsonBarracks_GWContourApr2022_A3P.mxd

A3 size

Appendix B

Tables

Table B1
Groundwater Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

Groundwater Field Results

AECOM

Location ID	Date	Depth to Water (mbTOC)	Well Depth (mbTOC)	TOC (mAHD)	Water Elevation (mAHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr)(mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method
MW001	21/04/2022	1.171	8.15	24.37	23.199	Good	4.42	80.9	52.6	4.59	115.3		30.5	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW004	21/04/2022	2.912	8.28	26.78	23.868	Good	1.37	92.5	60.1	4.75	115.2		32.9	Low	Slight yellow	Slight sulphur	No sheen	Hydrasleeve
MW004D	21/04/2022	2.848	31.30	26.78	23.932	Good	3.92	354.2	230.2	6.51	-0.9		31.5	Low	Grey	Sulphur	No sheen	Hydrasleeve
MW012	21/04/2022	3.372	NM	30.65	27.278	Good	3.16	73.4	47.7	4.96	102.7		32	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW012D	21/04/2022	5.083	30.75	30.77	25.687	Good	5.05	82.7	53.8	5.98	99.8		31.7	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW018	21/04/2022	2.615	8.71	25.57	22.955	Good	8.34	301.3	195.8	5.69	74.2		31.1	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW021	21/04/2022	2.226	8.72	18.03	15.804	Good	5.75	112.6	73.2	5.09	100.2		29.7	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW021D	21/04/2022	1.95	30.90	17.99	16.04	Good	3.04	179.6	116.7	5.94	60.9		30	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW024	21/04/2022	1.488	8.95	6.34	4.852	Good	3.54	693.0	450.5	5.84	75.2		30.3	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW029	21/04/2022	1.714	7.76	25.44	23.722	Good	4.16	301.4	195.9	5.82	-1.4		30.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW030	21/04/2022	0.809	7.14	23.33	22.521	Good	6.66	463.6	301.3	6.45	5.4		28.9	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW031	21/04/2022	2.264	8.06	25.56	23.294	Good	5.34	85.2	55.4	4.59	112.4		31.3	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW032	21/04/2022	2.162	8.68	19.86	17.7	Good	7.04	78.2	50.8	5.10	102.4		30.9	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW034	21/04/2022	2.486	11.49	19.50	17.014	Good	2.10	82.5	53.6	4.57	128.4		31.2	Low	Grey	Peutrified	No sheen	Hydrasleeve
MW066	21/04/2022	2.912	11.94	23.19	20.278	Broken	2.15	79.9	51.9	4.20	154.2		32.9	Low	Pale brown	Odourless	No sheen	Hydrasleeve
MW080	21/04/2022	2.511	13.00	26.60	24.089	Good	0.78	98.5	64.0	4.21	133.2		32.7	Low	Grey	Odourless	No sheen	Hydrasleeve
MW112	21/04/2022	NM	NM	NM	NM	Tapped Bore	2.98	339.4	220.6	6.75	-74.2		29.3	Low	Orange	Odourless	No sheen	Hydrasleeve
MW113	21/04/2022	NM	NM	NM	NM	Tapped Bore	3.04	364.4	236.9	6.82	63.2		31.3	Low	Colourless	Odourless	No sheen	Hydrasleeve

Notes:
MW024 - contingency well for dry MW023
mbTOC: metres below top of casing
mAHD: metres Australia Height Datum
NM: not measured
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table B2
Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

Groundwater Analytical Results

AECOM

		PFAS Full Suite																																
		10:2 FTS	4:2 FTS	6:2 FtS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MFOSAA	MeFOSE	PFBS	PFBA	PFDS	PFDA	PFDoDA	PFHpS	PFHpA	PFHxA	PFNA	FOSA	PFPeS	PFPeA	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFHxS and PFOS	PFOS	PFOA	PFHxS
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.05	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.02	0.05	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	0.02	0.02	0.01	0.01	0.01	0.01	0.01
Ecological Receptors	PFAS NEMP 2020 Freshwater 99%																												**0.00023**	**19**	
Human Health Receptors	PFAS NEMP 2020 Drinking Water																											**0.07**		**0.56**	

Location Code	Field ID	Date	Lab Report	Sample Type																														
MW001	1200_MW001_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.12	**0.12**	**0.08**	<0.01	0.04
MW004	1200_MW004_220422	22/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.04	0.04	**0.03**	<0.01	0.01
MW004	1200_QC104_220422	22/04/2022	ES2214158	Intralab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.05	0.05	**0.04**	<0.01	0.01
MW004	1200_QC204_220422	22/04/2022	EB2211961	Interlab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.04	0.04	**0.03**	<0.01	0.01
MW004D	1200_MW004D_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012	1200_MW012_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012D	1200_MW012D_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW018	1200_MW018_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021	1200_MW021_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021D	1200_MW021D_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW024	1200_MW024_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW024	1200_QC100_220420	20/04/2022	ES2214158	Intralab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW024	1200_QC200_220420	20/04/2022	EB2211961	Interlab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	**0.01**	**0.01**	**0.01**	<0.01	<0.01
MW029	1200_MW029_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW030	1200_MW030_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.14	**0.14**	**0.1**	<0.01	0.04
MW031	1200_MW031_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW032	1200_MW032_220420	20/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	0.05	<0.02	<0.02	<0.02	0.08	<0.05	<0.02	<0.02	0.24	**0.09**	**0.06**	<0.01	0.03
MW034	1200_MW034_220422	22/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	0.05	<0.02	<0.02	<0.02	0.06	<0.05	<0.02	<0.02	0.21	**0.08**	**0.05**	<0.01	0.03
MW034	1200_QC101_220422	22/04/2022	ES2214158	Intralab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	0.05	<0.02	<0.02	<0.02	0.05	<0.05	<0.02	<0.02	0.21	**0.09**	**0.06**	<0.01	0.03
MW034	1200_QC201_220422	22/04/2022	EB2211961	Interlab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	0.06	<0.05	<0.02	<0.02	0.2	**0.09**	**0.07**	<0.01	0.02
MW066	1200_MW066_220422	22/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.47	**0.42**	**0.34**	0.02	0.08
MW066	1200_QC102_220422	22/04/2022	ES2214158	Intralab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.4	**0.37**	**0.29**	0.01	0.08
MW066	1200_QC202_220422	22/04/2022	EB2211961	Interlab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.4	**0.36**	**0.28**	0.02	0.08
MW080	1200_MW080_220422	22/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW080	1200_QC103_220422	22/04/2022	ES2214158	Intralab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW080	1200_QC203_220422	22/04/2022	EB2211961	Interlab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW113	1200_MW113_220421	21/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW112	1200_MW112_220421	21/04/2022	ES2214158	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01

Notes:
µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedance of human health screening criteria

Table B3
Surface Water Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

January - Surface Water Field Results

AECOM

Location ID	Sampled Date	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method
SW001	20/01/2022	4.37	45.3	29.4	5.58	187.2	31.7	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW007	20/01/2022	7.38	22.8	14.8	5.71	174.5	32.3	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW023	20/01/2022	4.59	32.8	21.3	5.82	181.5	30.5	High	Pale brown	Odourless	No Sheen	Grab Sample
SW028	20/01/2022	4.73	5.6	3.6	5.84	205.6	27.9	High	Pale brown	Odourless	No Sheen	Grab Sample
SW059	20/01/2022	5.32	20.1	13.1	5.68	211.3	29.1	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW075	20/01/2022	3.80	35.0	22.8	6.79	122.2	32.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW086	20/01/2022	3.02	40.5	26.3	6.85	109.0	29.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW091	20/01/2022	3.50	27.1	17.6	6.44	117.2	29.7	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW123	20/01/2022	2.92	21.5	14.0	6.72	144.5	29.1	Clear	Colourless	Odourless	No Sheen	Grab Sample

Notes:
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table B4
Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Roberston Barracks

January - Surface Water Analytical Results

AECOM

		PFAS Full Suite																													
		10:2 FTS	4:2 FTS	6:2 FtS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MFOSAA	MeFOSE	PFBS	PFBA	PFDS	PFDA	PFDoDA	PFHpS	PFHpA	PFHxA	PFNA	FOSA	PFHxS	PFPeA	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFHxS and PFOS	PFOS	PFOA	PFHxS
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.05	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.02	0.05	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	0.02	0.02	0.01	0.01	0.01	0.01	0.01
Ecological Receptors	PFAS NEMP 2020 Freshwater 99%																												**0.00023**	**19**	
Human Health Receptors	PFAS NEMP 2020 Drinking Water																											**0.07**		**0.56**	
	PFAS NEMP 2020 Recreational Water																											**2**		**10**	

Location ID	Field ID	Date	Lab Report	Sample Type																												
SW001	1200_SW001_220120	20/01/2022	ES2201971	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.03	**0.02**	<0.01	0.01
SW007	1200_SW007_220120	20/01/2022	ES2201971	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW023	1200_SW023_220120	20/01/2022	ES2201971	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW028	1200_SW028_220120	20/01/2022	ES2201971	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW059	1200_SW059_220120	20/01/2022	ES2201971	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW075	1200_SW075_220120	20/01/2022	ES2201971	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.03	**0.02**	<0.01	0.01
	1200_QC100_220120	20/01/2022	ES2201971	Intralab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.02	**0.01**	<0.01	0.01
	1200_QC200_220120	20/01/2022	RN134191	Interlab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	**<0.01**	<0.01*	<0.01	<0.01
SW086	3097_SW086_220120	20/01/2022	ES2201970	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW091	3097_SW091_220120	20/01/2022	ES2201970	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.02	0.02	**0.02**	<0.01	<0.01
SW123	3097_SW123_220120	20/01/2022	ES2201970	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.03	**0.02**	<0.01	0.01

Notes:
µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedance of human health or ecological screening criteria

Table B5
Surface Water Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

April - Surface Water Field Results

AECOM

Location ID	Sampled Date	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Temp (°C)	Turbidity	Water Colour	Odour	Sheen	Sample Method
SW001	21/04/2022	2.53	246.7	160.4	5.49	97.1	30.8	Low	Colourless	Odourless	No Sheen	Grab Sample
SW007	21/04/2022 0:00	3.86	53.6	34.8	6.15	72.3	32.9	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW023	21/04/2022 0:00	Dry - No parameters										
SW028	21/04/2022	Dry - No parameters										
SW059	21/04/2022 0:00	4.02	68.2	44.3	6.82	105.2	34.2	Low	Slight brown	Odourless	No Sheen	Grab Sample
SW075	21/04/2022	3.62	64.5	41.9	5.43	80.5	28.2	Low	Colourless	Odourless	No Sheen	Grab Sample
SW086	21/04/2022	4.47	58.9	38.3	6.68	58.2	29.8	Low	Colourless	Odourless	No Sheen	Grab Sample
SW091	21/04/2022	4.07	55.8	36.3	5.91	70.2	29.9	Low	Slight brown	Odourless	No Sheen	Grab Sample
SW123	21/04/2022	4.00	49.2	32.0	5.77	79.2	29.6	Low	Slight yellow	Odourless	No Sheen	Grab Sample

Notes:
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table B6
Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence • Robertson Barracks

AECOM

		PFAS Full Suite																														
		10:2 FTS	4:2 FTS	6:2 FtS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MFOSAA	MeFOSE	PFBS	PFBA	PFDS	PFDA	PFDoDA	PFHpS	PFHpA	PFHxA	PFNA	FOSA	PFPeS	PFPeA	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFHxS and PFOS	PFOS	PFOA	PFHxS
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	0,05	0,05	0,05	0,05	0,05	0,02	0,05	0,05	0,02	0,05	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	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,01
Ecological Receptors	PFAS NEMP 2020 Freshwater 99%																												0,00023	19		
Human Health Recepti	PFAS NEMP 2020 Drinking Water																											0,07		0,56		
	PFAS NEMP 2020 Recreational Water																											2		10		
Location Code	**Field ID**	**Date**	**Lab Report**	**Sample Type**																														
SW001	1200_SW001_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	0,02	0,02	0,02	<0,01	<0,01
SW007	1200_SW007_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	<0,01	<0,01	<0,01*	<0,01	<0,01
SW059	1200_SW059_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	0,27	0,25	0,18	<0,01	0,07
SW075	1200_SW075_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	<0,01	<0,01	<0,01*	<0,01	<0,01
SW086	1200_SW086_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	<0,01	<0,01	<0,01*	<0,01	<0,01
SW091	1200_SW091_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	0,03	0,03	0,02	<0,01	0,01
SW123	1200_SW123_220421	21/04/2022	ES2214158	Primary	<0,05	<0,05	<0,05	<0,05	<0,05	<0,02	<0,05	<0,05	<0,02	<0,05	<0,02	<0,1	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,05	<0,02	<0,02	0,04	0,04	0,02	<0,01	0,02

Notes:
µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedance of human health screening criteria

Table B7
Surface Water Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

Sediment Field Results

AECOM

Location ID	Sampled Date	Colour	Characteristics	Odour	Sample Method
SD028	20/04/2022	Brown	Clayey SILT; with fine sands and rootlets, moist, no water	Odourless	Grab Sample
SD023	20/04/2022	Red-brown	SAND; fine-coarse grained, with fine-medium grained gravels, dry, no water	Odourless	Grab Sample
SD086	21/04/2022	Brown	SAND; fine-coarse grained, with fine-coarse grained gravels and low plasticity clay, trace rootlets, wet, moderate flow	Odourless	Grab Sample
SD123	21/04/2022	Brown	Silty SAND; fine-coarse grain gravels, trace rootlets, wet, flowing stream	Odourless	Grab Sample
SD091	21/04/2022	Brown	SAND; with fine-coarse gravels and rootlets, wet, high flow	Odourless	Grab Sample
SD075	21/04/2022	Grey-brown	Silty SAND; with fine-coarse gravels and rootlets, wet, high flow	Odourless	Grab Sample
SD059	21/04/2022	Red-brown	SAND; fine-coarse grained gravels, trace organics, algae present, pooled water	Odourless	Grab Sample
SD007	21/04/2022	Brown	SILT; with fine-coarse grained sands, trace gravels and organics, algae present, low flow	Odourless	Grab Sample
SD001	21/04/2022	Brown	Silty SAND; with fine-coarse gravels, with rootlets, pooled water	Odourless	Grab Sample

Table B8
Sediment Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

Sediment Analytical Results

AECOM

					PFAS Full Suite																												
					10:2 FTS	4:2 FTS	6:2 FtS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MeFOSAA	MeFOSE	PFBS	PFBA	PFDS	PFDA	PFDoDA	PFHxS	PFHpA	PFHxA	PFNA	FOSA	PFNS	PFPeA	PFHxDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFHxS and PFOS	PFOS	PFOA	PFHxS
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				LOR	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Location Code	**Field ID**	**Date**	**Sample Type**	**Lab Report**																													
SD001	1200_SD001_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	0.0003	0.0003	0.0003	<0.0002	<0.0002
SD007	1200_SD007_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD023	1200_SD023_220420	20/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD028	1200_SD028_220420	20/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD059	1200_SD059_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	0.0004	0.0004	0.0004	<0.0002	<0.0002
SD075	1200_SD075_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	0.0026	0.0013	0.0013	<0.0002	<0.0002
SD086	1200_SD086_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	0.005	0.005	0.0045	<0.0002	0.0005
SD091	1200_SD091_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD123	1200_SD123_220421	21/04/2022	Primary	ES2214158	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0005	<0.0002	<0.0002	0.0011	0.0007	0.0007	<0.0002	<0.0002

Notes:
mg/kg: milligrams per kilogram
LOR: limit of reporting

Appendix C

Sampling Logs

ANZ

FQM - NAPL and Groundwater Level Gauging Record

PFAS OMP

AECOM

Q4AN(EV)-414-FM1

Project Name:	PFAS OMP	**Project Location:**	[redacted]	**PM Name:**	James Guzman
Project Number:	60612561	**Client:**	Defence	**Fieldwork Staff Name:**	[redacted]

Confirm NAPL and groundwater levels by repeat measurements. All columns must be completed. If NAPL is not present in a well write "ND" (Not Detected) in the relevant column.

Field Data

Well ID	Date (dd/mm/yy)	Time (24hr:mm)	PID Reading (ppm)	Depth to LNAPL (mBTOC)	Depth to Groundwater (mBTOC)	LNAPL Thickness (m)	Depth to DNAPL (mBTOC)	Total Well Depth (mBTOC)	DNAPL Thickness (m)	Comments (well condition, odour, NAPL colour and viscosity)
MW004	19.04.22	9:10	0.0	ND	2.912	—	ND	8.28	—	G.C, NO, NS
MW004D		9:15	0.0	ND	2.848	—	—	~~31.30~~	—	G.C, HS already installed, NO, NS.
MW001		9:45	0.0	ND	1.171	—	ND	~~NM~~ 8.15	—	G.C, HS already in well, NO, NS.
MW010		11:50	0.0	ND	2.511	—	ND	12:00	—	G.C, NO, NS.
MW016		12:40	0.0	ND	2.412	—	ND	11.94	—	Broken old style gatic, NO, NS.
MW034		14:30	0.0	ND	2.486	—	ND	11.49	—	G.C, NO, NS.
MW012		16:45	0.0	ND	3.372	—	NM	NM	—	G.C, NO, NS, HS in well
MW020	—	16:50	0.0	ND	~~5.083~~	—	NM	~~NM~~ 30.75	—	G.C, NO, NS, HS in well.
MW029	20.04.22	08:08	0.0	ND	1.734	—	ND	7.76	—	G.C, NO, NS
MW030		09:30	0.0	ND	0.809	—	ND	7.14	—	G.C, NO, NS.
MW028		09:25	0.0	ND	2.226	—	ND	8.72	—	G.C, NO, NS
MW028D		09:30	0.0	ND	1.950	—	ND	30.90	—	G.C, NO, NS.
MW024		10:00	0.0	ND	1.488	—	ND	8.45	—	G.C, NO, NS.
MW018		10:35	0.0	ND	2.615	—	ND	8.71	—	G.C, NO, NS
MW032		11:02	0.0	ND	2.162	—	ND	8.60	—	G.C, NO, NS, sediment on probe
MW031		11:30	0.0	ND	2.264	—	ND	8.06	—	G.C, NO, NS, sediment on probe
MW113										Tapped well
MW112										Tapped well

Measurement Equipment

Make & Model:		**Supplier:**	
Serial No.:		**Calibration Report Provided?**	

Notes/Comments

(PID) - photo ionisation detector; (ppm) - parts per million; (LNAPL) - light non-aqueous phase liquids; (DNAPL) - dense light non-aqueous phase liquid; (mBTOC) - metres below top of casing

Approval and Distribution

[redacted]

[redacted]

Distribution: Project Central File

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FQM - Groundwater Sampling and Purging Record

PFASOMP

Q4AN(EV)-405-FM1

Project Name:	[redacted]	Project Number:	[redacted]	PM Name:	[redacted]
Client:	Department of Defence	Project Location:	ROBBD	Fieldwork Staff:	[redacted]
Sample Date:	21.04.22				
Well Development or Well Sampling Event? (circle)					

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: 451	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☑ Other (specify) GRAB	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☑ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

	Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
SW075	07:47	—	—	—	3.62	464.5	5.43	80.5	28.2	Colourless, low turb, NO, NS, low flow
MW113	09:15	—	—	—	3.04	314.4	6.82	63.2	31.3	Colourless, low turb, NO, NS, from tap
MW114	09:22	—	—	—	2.90	339.4	6.75	-74.2	29.3	Orange, low turb, NO, NS, from tap.
SW086	9:59	—	—	—	4.47	58.4	6.68	58.2	29.8	Colourless, low turb, NO, NS, high flow
SW123	10:21	—	—	—	4.00	49.2	5.77	79.2	29.6	Slight yellow, NO, NS, mod flow, low turb
SW091	10:48	—	—	—	4.07	55.0	5.91	70.2	29.9	Slight brown, NO, NS mod flow
SW059	13:35	—	—	—	4.02	68.2	6.82	105.7	34.2	Slight brown, low turb, NO, NS, algae.
SW007	14:38	—	—	—	3.86	53.6	6.15	72.3	32.9	Colourless, low turb, NO, NS, algae, low flow
SW001	14:57	—	—	—	2.53	246.7	5.49	97.1	30.8	Colourless, low turb, a lot of algae, NO, NS.
MW034	8:59	—	—	—	2.10	82.5	4.57	126.4	31.2	Grey, low turb, peat rich, ado/ frogs QC101
MW066	9:55	—	—	—	2.15	79.9	4.20	154.2	32.9	Pale brown, low turb, NO, NS, QC102/202
MW080	16:20	1.0	—	—	0.78	98.5	4.21	133.2	32.7	Grey, low turb, NO, NS, QC103/203
MW004	16:48	1.0	—	—	1.37	92.6	4.75	115.2	32.9	Slight yellow, slight H_2S od., low turb, NS
	Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		QC104/204
0	2		x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		2	X PFAS						Note: MW112 was mistakenly listed on form as MW114.

Approval and Distribution

[redacted]

20/04/2022 PFASOMP. NO: No odour NS: No sheen

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FQM - Groundwater Sampling and ~~Purging~~ Record

Q4AN(EV)-405-FM1

[redacted]

Project Name:	[redacted]	Project Number:	[redacted]	PM Name:	[redacted]
Client:	Department of Defence	Project Location:	Robertson B.	Fieldwork Staff:	[redacted]

Sample Date:

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size: 1.6L	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: VSI	☑ Dedicated	Intake depth:	Hydrasleeve Type: PFAS Free	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☑ Hydrasleeve	Sampling Depth (m-pvc):	Gauging 2
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in 8
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out 3
	Key Type (if applicable):	☑ Retrieved				Parameters 4
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

Time	Cumulative Vol. Removed (L)	TD Sink (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
08:15	1.0	MW028	—	4.16	3014	5.82	-1.4	30.6	Light brown, low turbidity NO, NS
08:30	1.0	MW030	—	6.66	463.6	6.45	5.4	28.9	Light brown, moderate turbidity, NO, NS.
09:33	1.0	MW021	—	5.75	112.6	5.09	100.2	29.7	Light brown, low turb, NO, NS.
09:41	1.0	MW021D	—	3.04	179.6	5.94	60.9	30.0	Light brown, low turb, NO, NS.
10:05	1.0	MW024	—	3.54	6930	5.84	75.2	30.3	Light brown, low turb, NO, NS dup/trip.
10:40	1.0	MW018	—	8.34	301.3	5.69	74.2	21.1	Light brown, low turb, NO, NS.
11:05	1.0	MW032	—	7.04	78.2	5.10	102.4	30.9	Light brown, low turb, NO, NS.
11:36	1.0	MW031	—	5.34	85.2	4.59	112.4	31.3	Light brown, moderate turb, NO, NS
13:00	1.0	MW001	—	4.42	80.9	4.59	115.3	30.5	Light brown, low turbidity NO, NS
13:15	1.0	MW004D	—	3.92	3542	6.51	-0.9	31.5	Grey, low turbidity, NO NS, H2S odour
13:30	1.0	MW012D	—	5.05	82.7	5.98	99.8	31.7	Light brown, low turb, NO, NS.
13:40	1.0	MW012	—	3.16	73.4	4.96	102.7	32.0	Colourless, no turb, orange S.S, NO, NS, roots on HS.
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected				QA/QC Information	Field Comments
Field Filtered:	Unfiltered:	x 40 mL Vial (HCl)		x 60 mL Ferrous	x 60 mL metals (HNO_3)	@C100/200 @MW024	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
D	2	x 40 mL Vial (H_2SO_4)		x 100 mL Amber	x 250 mL Plastic		
		2 x PFAS					

Approval and Distribution

[redacted]

ANZ

FQM - Groundwater Sampling and Purging Record

AECOM

Q4AN(EV)-405-FM1

Project Name:	~~WQMP~~ PFAS GMP	Project Number:		PM Name:	JG	Sample Date:	20.01.22
Client:	~~Ventia~~ DoD	Project Location:	Robb	Fieldwork Staff:	PH/JG/APP/AT/PS	Well Development or Well Sampling Event? (circle)	

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model: 451	☐ Dedicated	Intake depth:	Hydrasleeve Type:	Gauging
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Hydrasleeve in
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve out
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☑ Retrieved		☑ Other (specify) GRAB	Sampling Start Time:	Parameters
	Key Type (if applicable):					
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters									
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
SW086 9:20	—	—	—	3.02	40.5	6.85	109.0	29.6	Colourless, no odour/sheen/turbidity, foam
SW123 10:00	—	—	—	2.92	21.5	6.72	144.5	29.1	" " algae flowing
SW091 10:33	—	—	—	3.50	27.1	6.44	117.2	29.7	" "
~~SW003~~ 11:40	—	—	—	2.55	81.4	6.14	146.3	32.5	" " slow flow
~~SW001~~ 12:13	—	—	—	4.21	79.9	6.64	109.3	33.6	" "
SW075 14:15	—	—	—	3.80	35.0	6.79	122.2	32.5	" " fish eggs
SW001 14:45	—	—	—	4.37	75.3	5.58	187.2	31.7	" "
SW007 15:00	—	—	—	7.38	22.8	5.71	174.5	32.3	" "
SW023 15:15	—	—	—	4.59	32.8	5.82	181.5	30.5	Pale brown, high turb, no odour/sheen, high flow
SW059 15:25	—	—	—	5.23	20.1	5.68	211.3	29.1	" "
SW028 15:50	—	—	—	4.73	5.6	5.84	205.6	27.9	Pale brown, low turb, no odd/sheen, high flow
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Commets
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)	D/T - SW075	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

[redacted]

ANZ

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FQM - Groundwater Sampling and Purging Record

PFASOMP SEDIMENT.

Q4AN(EV)-405-FM1

Project Name:	[redacted]	Project Number:	[redacted]	PM Name:	[redacted]
Client:	Department of Defence	Project Location:	Robertson B.	Fieldwork Staff:	[redacted]

Sample Date: 20-4-22

Well Development or Well Sampling Event? (circle)

General Bore Information		Parameter Info.	Decontamination	Sampling Method	Hydrasleeve Info.	
Date of GW Level:	Bore Radius (mm):	Chem Kit Serial No.:	☑ Decontaminated	☐ Low Flow Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	Screen Interval (m):	Chem Kit Model:	☐ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☑ Other (specify) GRAB	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☐ Retrieved				Parameters
Calculated bore volume (L):	Includes/ excludes bore annulus (circle)	# purge volumes removed:		Total purged volume (L):		

Water Quality Parameters

	Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
20.04	14:00	SD028	Dry	Blayey SILT; brown, w rootlets, trace fine sands, low plasticity, moist, no water						
	14:20	SD023	SAND; red/brown, w f-mgr gravels f-cgr sands, dry, no water							
	9:50	SD086	SAND brown, w f-c gr gravels + silt/clay, wet, trace rootlets, flowing stream							
21.04	10:20	SD123	Silty SAND, brown f-cgr gravels, flowing stream, trace rootlets							
	10:45	SD091	SAND brown, w f-gr gravels, trace rootlets, high flow							
	12:20	SD075	Silty SAND, grey/brown, w f-c gr wels + roots, high flow wet.							
	13:30	SD059	SAND: red/brown, f-c gr, trace organics, pooled water, algae.							
	14:34	SD007	SILT: brown, w f-c gr sand, trace gravels + organics, low flow, algae, channel.							
	14:57	SD001	Silty SAND, brown, w f-c gravels + roots, low/no flow.							
	Acceptable Parameter Range:			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)	

Analytes Sampled for:		Bottles Collected						QA/QC Information	Field Comments
Field Filtered:	Unfiltered:		x 40 mL Vial (HCl)		x 60 mL Ferrous		x 60 mL metals (HNO_3)		Bore volume calculation, bore condition, fate of tubing, redox correction etc.
			x 40 mL Vial (H_2SO_4)		x 100 mL Amber		x 250 mL Plastic		

Approval and Distribution

[redacted]

Appendix D

Data Validation Report

AECOM

DATA VALIDATION REPORT; WATER & SEDIMENT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	
Site:	1200 – Robertson Barracks		
Matrix:	Water & Sediment	**Data Verified by:**	
Laboratory:	ALS, NMI	**Date:**	
Lab reference:	Water: ES2201970, ES2201971, RN1341391, EB2211961 Water & sediment: ES2214158		

Key Findings:
The analytical data can be used as a basis for interpretation, subject to the limitations outlined below:

- The potential exists for concentrations of PFOS to be below the LOR, but above the adopted guideline and this should be taken into consideration when interpreting results

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)			✓	1	No
Number of tests requested/reported		✓			
Sample handling/preservation/holding times			✓	2	No
Frequency of laboratory QA/QC		✓			
Limits of reporting (LOR)			✓	3	No
Blank analysis	Field blank	✓			
	Rinsate blank	✓			
	Trip blank	✓			
	Method blank	✓			
Field intra-laboratory relative percent differences (RPDs)		✓			
Field inter-laboratory RPDs		✓			
Laboratory duplicate RPDs		✓			
Matrix spike (MS) % recoveries			✓	4	No
Laboratory control spike (LCS) % recoveries		✓			
Surrogate % recoveries		✓			
Other observations			✓	6	No

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Comments	
1.	Field QA/QC samples are to include intra-laboratory duplicate (Duplicate) and inter-laboratory duplicate (Triplicate) samples and rinsate samples. Duplicate and triplicate samples are to be collected at a minimum frequency of 1 in 20 PFAS primary samples (six of both collected). Rinsate samples are to be collected at a rate of one sample per day of sampling (three collected) when non-dedicated equipment is used, by pouring laboratory supplied PFAS free deionised water over the decontaminated sampling equipment. Four field blanks and two trip blanks.
2.	Field intra- and inter-laboratory duplicate samples were not collected at the required at a rate of one per ten primary samples for sediment for assessment of results against the PFAS National Environmental Management Plan (NEMP) 2020. The precision of the data can be assessed as acceptable based on the available laboratory duplicate RPDs which were reported within control limits. Field intra- and inter-laboratory duplicate samples were not collected at the required at a rate of one per ten primary samples for water samples in April 2022 for assessment of results against the PFAS National Environmental Management Plan (NEMP) 2020. The precision of the data can be assessed as acceptable based on the available laboratory duplicate RPDs which were reported within control limits and based on the available intra- and inter-laboratory duplicates as part of the overarching sampling program (January 2022), which were generally reported within control limits.
3. Sample Handling	All laboratory batches were received inside the recommended temperature range (≤6°C) with the exception of the following: Batch Number / Temperature (°C) ES2201970 / 11.1 ES2201971 / 11.1 ES2214158 / 14.9 For the noted batches, the temperatures were recorded well below the ambient groundwater temperature at the time of sampling (~30°C) and samples were immediately cooled upon collection, the likelihood of under reporting is unlikely and immaterial to the interpretation of results.
4. Limits of Report	Limits of reporting were sufficiently low to enable assessment against adopted guideline criteria, except for PFOS. The potential exists for concentrations of key COPC PFOS to be above the PFAS NEMP fresh water 99% species protection guideline, but below the laboratory LOR. This should be taken into consideration when interpreting data and using data quantitatively.

5. Matrix Spike % Recoveries	Matrix spike recoveries (where reported) were within control limits. Matrix spike recoveries were not determined for PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFBA, PFPeA, PFHxA, PFHpA, PFOA, MeFOSE and 6:2 FTS as background levels were greater than or equal to 4x spike levels. These non-determinations do not reflect method bias and do not affect data interpretation. The accuracy of the data can be assessed as acceptable based on method blanks, LCS and surrogate spike recoveries (which were reported at or above the required frequencies and within control limits), and available matrix spike recoveries for the same analytical method group (which were reported within control limits). Matrix spike recoveries (where reported) were within control limits, with the following exceptions:

Analyte	Recovery (%)	Range (%)	Comment
MeFOSE	67.3	68.7-130	Recovery less than lower data quality objective

The potential exists for concentrations of MeFOSE to be bias low by up to 32.7%.
As there is no adopted guideline value for MeFOSE the potential for under reporting is not expected to affect interpretation of the results against guidelines. However, this potential for under reporting should be taken into consideration when using the data quantitatively.

ALS laboratory noted poor matrix spike recovery due to matrix interferences in laboratory batch EM2214158.

6. Other Observations	The interlaboratory duplicate from MW024 had a reported concentration of PFAS at the LOR, whereas the primary and intra-laboratory samples were reported below the LOR. Concentrations of PFAS are not anticipated in this sampling location, and since the primary and intra-laboratory duplicate sample reported no PFAS concentrations at or above the LOR, it was suspected that the interlaboratory reported result was either a lab error or a sampling error that led to cross-contamination. Resampling was conducted to confirm whether PFAS was in this sampling location or not. Reanalysis confirmed that there is no detectable PFAS in this location and suggests the previously reported PFAS concentration was either a lab or a sample collection error.

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Appendix E

Chain of Custody

02.02.22

CHAIN OF CUSTODY

(ALS) COC#: 32658 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 27.01.22 11AM	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM AUSTRALIA PTY LTD

PROJECT: NT_3097_PFASOMP

SITE: NT_3097_PFASOMP

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO:

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 DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Waters - New Analysis WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	3097_SW086_220120		20/01/2022 10:48 AM	Water	ALS: 2 Non ALS: 0	No	X		
002	3097_SW123_220120		20/01/2022 11:36 AM	Water	ALS: 3 Non ALS: 0	No	X		Extra qc volume
003	3097_SW091_220120		20/01/2022 12:09 PM	Water	ALS: 2 Non ALS: 0	No	X		

Environmental Division
Sydney
Work Order Reference
ES2201970

Telephone : +61-2-8784 8555

Thursday, January 20, 2022 7:06:36 AM

ES2201970

CHAIN OF CUSTODY

COC#: 32658 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY [redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 20.01.22 11AM	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM AUSTRALIA PTY LTD

PROJECT: NT_3097_PFASOMP

SITE: NT_3097_PFASOMP

ORDER NO:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO:

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	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	3097_SW086_220120	HDPE (no PTFE)	20 mL	00352010002058	Grey	No	
001	3097_SW086_220120	HDPE (no PTFE)	20 mL	00352010002008	Grey	No	
002	3097_SW123_220120	HDPE (no PTFE)	20 mL	00352005002004	Grey	No	
002	3097_SW123_220120	HDPE (no PTFE)	20 mL	00352005001950	Grey	No	
002	3097_SW123_220120	HDPE (no PTFE)	20 mL	00350719054380	Grey	No	
003	3097_SW091_220120	HDPE (no PTFE)	20 mL	00350019180545	Grey	No	
003	3097_SW091_220120	HDPE (no PTFE)	20 mL	00350019180594	Grey	No	

Total Bottle Count: ALS: 7, Non ALS: 0

1/5 SYDNEY.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	☒ Standard TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT: NT_1200_PFASOMP	☐ Non Standard or urgent TAT (List due date):	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER: NT_1200_PFASOMP	ALS QUOTE NO.: SY-478-20-B-v2	Random Sample Temperature on Receipt:	°C
[redacted]	COC SEQUENCE NUMBER (Circle): COC: 1 2 3 4 5 6 7; OF: 1 2 3 4 5 6 7	Other comment:	

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
AECOM - [redacted]	[redacted]		[redacted]
DATE/TIME: 22.04.22	DATE/TIME: 26/04/22	DATE/TIME:	DATE/TIME: 27.04.22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-018.02A	TRHBTEXN8 mists - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	1200_MW029_220420	20.04.22	W	24PFAS	2	X										Subcon / Forward Lab / Split WO:
2	1200_MW030_220420		W		2	X										Lab / Analysis: QC200, QC201, QC202
3	1200_QC300_220420		W		2	X										Organised By / Date: QC203, QC204 → Brisbane
4	1200_QC400_220420		W		2	X										Relinquished By / Date:
5	1200_MW021_220420		W		2	X										Courier / Courier:
6	1200_MW021D_220420		W		2	X										WO No:
7	1200_MW024_220420		W		2	X										Attached By PO / Internal Sheet:
8	1200_QC100_220420		W		2	X										
X	1200_QC200_220420		W		2	X										→ PLS FWD TO ALS BRIS
9	1200_QC500_220420		W		2	X										
10	1200_MW018_220420		W		2	X										
11	1200_MW032_220420		W		2	X										
				TOTAL												

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

Environmental Division
Sydney
Work Order Reference
ES2214158

Telephone : 61-2-8784 8555

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS: ❖ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes No N/A
PROJECT: ~~NT_ WQMP-21~~ NT_1200_PFASMP	ALS QUOTE NO.: SY-478-20-B-v2	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: NT_1200_PFASOMP	60612561	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
[redacted]		OF: 1 2 3 Rel 6 8 7	Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
[redacted]			[redacted]
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 17.04.22 10pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-015/02A	TRH/BTEX/N8 metals - W-05	S Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-38	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
12	1200_MW031_220420	20.04.22	W	2xPFAS.	2	X										
13	1200_MW001_220421		W		2	X										
14	1200_MW004D_220420		W		2	X										
15	1200_MW012D_220420		W		2	X										
16	1200_MW012_220420		W		2	X										
17	1200_SD028_0.1_220420		SW	1x JAR.	1	X										
18	1200_SD023_0.1_220420		W	1x JAR	1	X										
19	1200_SW075_220421	21.04.22	W	2x PFAS.	2	X										
20	1200_MW113_220421		W		2	X										
21	1200_MW114_220421		W		2	X										
22	1200_SW086_220421		W		2	X										
23	1200_SD086_220421		W	1xJAR	1	X										
				TOTAL												

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

BRISBANE: 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: [redacted]@alsglobal.com

GLADSTONE: 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5692 E: [redacted]@alsglobal.com

MACKAY: 78 Hodgens Road Glenella QLD 4740 Ph: 07 4941 8177 E: [redacted]@alsglobal.com

MELBOURNE: 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: [redacted]@alsglobal.com

MURDOCH: 27 Bethany Road Hazelmere WA 6055 Ph: 08 9359 0890 E: [redacted]@alsglobal.com

NEWCASTLE: 5/15 Mitchell Rd Mayfield West NSW 2304 Ph: 02 4968 9433 E: [redacted]@alsglobal.com

ORANGE: 1/13 Geary Place Orange NSW 2800 Ph: 02 6393 0600 E: [redacted]@alsglobal.com

PERTH: 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: [redacted]@alsglobal.com

SYDNEY: 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: [redacted]@alsglobal.com

TOWNSVILLE: 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: [redacted]@alsglobal.com

WAGGA WAGGA: 19 Kenny Street Wagga NSW 2650 Ph: 02 6225 3125 E: [redacted]@alsglobal.com

CLIENT: AECOM	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☒ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE: Darwin	
PROJECT: [redacted]	ALS QUOTE NO.: SY- 478 - 26 - 8 - v2
ORDER NUMBER: NT-1200_PFAS0MP	Invoicing: [redacted]

COC SEQUENCE NUMBER (Circle): COC: 1 2 3 4 5 6 7; OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY: [redacted]
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 27-04-22 (2pm)

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).											Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-01602A	TRH/BTEX/8 metals - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-20	Explosives - EP203SL	Tributyltin	VOC trip blank - W18		
24	1200_SW123_220421	21.04.22	W		2	X											
25	1200_SD123_220421		S		1	X											
26	1200_SD091_220421		S		1	X											
27	1200_SW091_220421		W		2	X											
28	1200_SD075_220421		S		1	X											
29	1200_SW059_220421		W		2	X											
30	1200_SD059_220421		S		1	X											
31	1200_SD007_220421		S		1	X											
32	1200_SW007_220421		W		2	X											
33	1200_QC301_220421		W		2	X											
34	1200_QC401_220421		W		2	X											
35	1200_SW001_220421		W		2	X											
				TOTAL													

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

36 1200_SD001_220421

4 of 5

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GOLD COAST 46 Callemondah Drive Clinton QLD 4680 Ph: 07 3471 5600 E: goldcoast@alsglobal.com
MACKAY 78 Harbour Road Hendra QLD 4740 Ph: 07 3418 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MURDOCH 27 Sydney Road Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
ORANGE 277-279 Woodward Road Dubbo NSW 2830 Ph: 02 6884 9555 E: samples.orange@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: samples.townsville@alsglobal.com
WAGGA WAGGA 49 Kenny Street Wagga Wagga NSW 2650 Ph: 02 6971 9696 E: samples.wagga@alsglobal.com

CLIENT: AECOM
OFFICE: Darwin
PROJECT: NT_1200-PFASOMP
ORDER NUMBER: NT-1200-PFASOMP

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

ALS QUOTE NO.: SY-478-20-B-v2
Invoicing [redacted] EQ61256 1/2.1

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

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

[redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
AECOM - [redacted]			[redacted]
DATE/TIME: 22.04.22.	DATE/TIME:	DATE/TIME:	DATE/TIME: 27.04.22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-018/02A	TRH/BTEX/N/B metals - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
36	1200_SD001_220421	21.04.22	SW	1x 250g	1	X										
37	1200_QR01_220422	22.04.22	W	2x PFAS	2	X										
—	1200_QC201_220422		W		2	—	—	—	—	—	—	—	—	—	—	PLS FWD TO ALS BR
38	1200_QC102_220422		W		2	X										
—	1200_QC202_220422		W		2	—	—	—	—	—	—	—	—	—	—	FWD TO BRIS.
39	1200_QC303_220422		W		2	X										
—	1200_QC203_220422		W		2	✓	—	—	—	—	—	—	—	—	—	FWD TO BRIS.
40	1200_QC302_220422		W		2	X										
41	1200_QC402_220422		W		2	X										
42	1200_MW034_220422		W		2	X										
43	1200_MW066_220422		W		2	X										
44	1200_MW080_220422		W		2	X										
				TOTAL												

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

✓ 1200_MW004_220422 V 2 X

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 61 8 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 61 7 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 61 7 4971 9676 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 61 7 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2nd Floor Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: samples.mudgee@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
ORANGE 1/63 Gaskill Place North Orange NSW 2800 Ph: 02 6393 8788 E: samples.orange@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: samples.townsville@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: samples.wollongong@alsglobal.com

CLIENT:	AECOM
OFFICE:	NT_1200-PFASOMP
PROJECT:	[redacted]
ORDER NUMBER:	NT-1200-PFASOMP

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

ALS QUOTE NO.: SY-478-20-B-v2

Invoicing: [redacted] 6061256 1/2-1

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

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 27-04-22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - MT-018.02A	TRH/BTEX/8 metals - W-65	8 Dissolved Metals - W-62	Additional metal (Fe) - EG020	HNA - W-28	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
45	1200_MW204_220422	22-04-22	W	24PFAS	2	X										
46	1200_QC104_220422		W		2	X										
~~47~~	~~1200_QC204_220422~~		W		2	X										FWD TO ALS BRIS
	~~1200_QC304_220422~~		W		~~2~~	~~X~~										
			W													
			W													
			W													
			W													
			W													
			W													
			W													
			W													
			W													
	TOTAL															

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

1/5 SYDNEY.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ❖ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: NT_1200_PFASCMP		Custody Seal Intact?	Yes No N/A
PROJECT: ~~NT_____WOMP_21 PFAS EMBA~~	ALS QUOTE NO.: SY-478-20-B-v2	Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER: NT_1200_PFASCMP	606125621/2.1	Random Sample Temperature on Receipt:	°C
[redacted]	COC SEQUENCE NUMBER (Circle) COC: (1) 2 3 4 5 6 7 OF: 1 2 3 (4) (5) 6 7	Other comment:	

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
AECOM [redacted]	[redacted]		[redacted]
DATE/TIME: 22-04-22	DATE/TIME: 26/04/22	DATE/TIME:	DATE/TIME: 27.04.22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-01&02A	TRH/BTEX/Naphthalene - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	1200_MW029_220420	20-04-22	W	2xPFAS	2	X										Subcon / Forward Lab / Split WO:
2	1200_MW030_220420		W		2	X										Lab / Analysis: QC200, QC201, QC202
3	1200_QC300_220420		W		2	X										Organised By / Date: QC203, QC204 → Brisbane
4	1200_QC400_220420		W		2	X										Relinquished By / Date:
5	1200_MW021_220420		W		2	X										Couriers / Courier:
6	1200_MW021D_220420		W		2	X										WO No:
7	1200_MW024_220420		W		2	X										Attached By PO / Internal Sheet:
8	1200_QC100_220420		W		2	X										
~~X~~	1200_QC200_220420		W		2	X										→ FWD TO ALS BRIS
9	1200_QC500_220420		W		2	X										
10	1200_MW018_220420		W		2	X										
11	1200_MW032_220420		W		2	X										
				TOTAL												

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

Environmental Division
Brisbane
Work Order Reference
EB2211961

Telephone : +61-7-3243 7222

Received in Bris
29/4/22 13:00
[redacted]

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ALS BRISBANE: 21 Smallwood Place Murarrie QLD 4172 Ph: 07 3902 4600 E: samples.brisbane@alsglobal.com

ALS TOWNSVILLE: 14-15 Desma Court Garbutt QLD 4814 Ph: 07 4796 0600 E: samples.townsville@alsglobal.com

ALS NEWCASTLE: 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

ALS SYDNEY: Unit 1, 16 Mars Road Lane Cove West NSW 2066 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

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

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

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

ALS GOLD COAST: 1/2 Dacoma Court Molendinar QLD 4214 Ph: 07 5644 8000 E: samples.goldcoast@alsglobal.com

ALS CANBERRA: 2 Bryant Street Fyshwick ACT 2609 Ph: 02 6280 0400 E: samples.canberra@alsglobal.com

ALS ORANGE: 1/10 Kenny Street Orange NSW 2800 Ph: 02 6364 5434 E: samples.orange@alsglobal.com

CLIENT: AECOM	TURNAROUND REQUIREMENTS: ◆ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes No N/A
PROJECT: ~~NT_ WQMP_21~~ NT_1200_PFASSMP	ALS QUOTE NO.: SY-478-20-B-v2	Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER: NT_1200_PFASSMP	60612561	Random Sample Temperature on Receipt:	°C
[redacted]	COC SEQUENCE NUMBER (Circle): COC: 1 2 3 4 5 6 7; OF: 1 2 3 4 5 6 7	Other comment:	

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:	DATE/TIME:	[redacted] DATE/TIME: 27.04.22 10pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-01&02A	TRH/BTEX/8 metals - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP2035L	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
12	1200_MW051_220420	20.04.22	W	2xPFAS.	2	X										
13	1200_MW001_220420	"	W	"	2	X										
14	1200_MW004D_220420	"	W	"	2	X										
15	1200_MW012D_220420	"	W	"	2	X										
16	1200_MW012_220420	"	W	"	2	X										
17	1200_SD028_0.1_220420	"	SW	1x JAR.	1	X										
18	1200_SD033_0.1_220420	"	W	1x JAR.	1	X										
19	1200_SW075_220421	21.04.22	W	2x PFAS.	2	X										
20	1200_MW013_220421	"	W	"	2	X										
21	1200_MW114_220421	"	W	"	2	X										
22	1200_SW086_220421	"	W	"	2	X										
23	1200_SD086_220421	"	W	1xJAR	1	X										
				TOTAL												

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 84 Callemondah Drive Clinton QLD 4680 Ph: 07 4971 5800 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 24 Westall Road Spengrove VIC 3173 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.env@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
ORANGE 4/13 Geary Place North Orange NSW 2800 Ph: 02 6423 2063 E: orange@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE Unit 15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: AECOM	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	◉ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: [redacted]		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: [redacted] NT-1200-PFASOMP	ALS QUOTE NO.: SY-478-20-B-v2	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: NT-1200-PFASOMP	Invoicing [redacted]	OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
[redacted]			Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:	DATE/TIME:	[redacted] DATE/TIME: 27-04-22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-016S2A	TRH/BTEX/N8 metals - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
24	1200_SW123_220421	21.04.22	W		2	X										
25	1200_SD123_220421		S		1	X										
26	1200_SD091_220421		S		1	X										
27	1200_SW091_220421		W		2	X										
28	1200_SD075_220421		S		1	X										
29	1200_SW059_220421		W		2	X										
30	1200_SD059_220421		S		1	X										
31	1200_SD007_220421		S		1	X										
32	1200_SW007_220421		W		2	X										
33	1200_QC301_220421		W		2	X										
34	1200_QC401_220421		W		2	X										
35	1200_SW001_220421		W		2	X										
				TOTAL												

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

[redacted] 1200_SD061_220421

4 of 5

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples_brisbane@alsglobal.com
GLADSTONE 34 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 24 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples_melbourne@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples_brisbane@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples_perth@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples_newcastle@alsglobal.com
ORANGE 2/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples_sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: AECOM	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	⊕ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Darwin		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: [redacted]	ALS QUOTE NO.: SY-478-20-B-v2		Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: NT-1200-PFASOMP	Invoicing [redacted] 6061756 1/2.1	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
[redacted]			Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
AECOM - [redacted]			[redacted]
DATE/TIME: 22.04.22	DATE/TIME:	DATE/TIME:	DATE/TIME: 27.04.22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-018/22A	TRH/BTEX/N8 metals - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP203SL	Tributyltin	VOC trip blank - W18	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
36	1200_SD001_220421	21.04.22	SW	1x 5mL	1	X										
37	1200_SW01_220422	22.04.22	W	2x PFAS	2	X										
—	1200_QC201_220422		W	—	2	—	—	—	—	—	—	—	—	—	—	FLS FWD TO ALS BR
38	1200_QC102_220422		W		2	X										
—	1200_QC202_220422		W	—	2	—	—	—	—	—	—	—	—	—	—	FWD TO BRIS.
39	1200_QC103_220422		W		2	X										
—	1200_QC203_220422		W	—	2	—	—	—	—	—	—	—	—	—	—	FWD TO BRIS.
40	1200_QC302_220422		W		2	X										
41	1200_QC402_220422		W		2	X										
42	1200_MW034_220422		W		2	X										
43	1200_MW006_220422		W		2	X										
44	1200_MW080_220422		W	—	2	X										
				TOTAL												

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

✓ 1200_MW014_220422 W 2 X

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: amdelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Hasbone Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
ORANGE 4/13 Geary Place North Orange NSW 2941 Ph: 02 6402 2060 E: orange@alsglobal.com
PERTH 10 Hod View Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: AECOM	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)
OFFICE: [redacted]	☒ Standard TAT (List due date):
PROJECT: [redacted]	☐ Non Standard or urgent TAT (List due date):
ORDER NUMBER: NT-1200-PFASAMP	ALS QUOTE NO.: SY-478-20-B-v2
[redacted]	Invoicing [redacted] 606125612-1

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

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

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:	DATE/TIME:	[redacted] DATE/TIME: 22-04-22 12pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X	Suspended Solids - EA025H	Cations/ Anions - NT-01&02A	TRH/BTEX/N8 metals - W-05	8 Dissolved Metals - W-02	Additional metal (Fe) - EG020	MNA - W-28	Explosives - EP2035L	Tributyltin	VOC trip blank - W18	
45	1200_MW204_220422	22-04-22	W	2xPPM	2	X										
46	1200_QC104_220422	"	W	"	2	X										
~~*~~	1200_QC204_220422	"	W	—	2	X	—	—	—	—	—	—	—	—	—	FWD TO ALS BRIS
	~~1200_BC01_220422~~	"	W	~~—~~	~~2~~	~~X~~										
			W													
			W													
			W													
			W													
			W													
			W													
			W													
			W													
			W													
				TOTAL												

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

Appendix F

Laboratory Certificates

Appendix F Laboratory Certificates

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2218928**	Page	: 1 of 4
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: 60612561	Date Samples Received	: 31-May-2022
Site	: NT_1200_PFASOMP	Issue Date	: 07-Jun-2022
Sampler	: [redacted]	No. of samples received	: 2
Order number	: -	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW024_220530	30-May-2022	03-Jun-2022	26-Nov-2022	✓	07-Jun-2022	26-Nov-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW024_220530	30-May-2022	03-Jun-2022	26-Nov-2022	✓	07-Jun-2022	26-Nov-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
1200_MW024_220530	30-May-2022	03-Jun-2022	26-Nov-2022	✓	07-Jun-2022	26-Nov-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW024_220530	30-May-2022	03-Jun-2022	26-Nov-2022	✓	07-Jun-2022	26-Nov-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_MW024_220530	30-May-2022	03-Jun-2022	26-Nov-2022	✓	07-Jun-2022	26-Nov-2022	✓

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)							
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
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2218928**	Page	: 1 of 5
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: 60612561	Date Samples Received	: 31-May-2022 06:30
Order number	: -	Date Analysis Commenced	: 31-May-2022
C-O-C number	: 38287	Issue Date	: 07-Jun-2022 12:33
Sampler	: [redacted]		
Site	: NT_1200_PFASOMP		
Quote number	: SY/139/19 V3		
No. of samples received	: 2		
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*
[redacted]	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.

- 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.
- 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: WATER (Matrix: WATER)				Sample ID	1200_MW024_220530	---	---	---	---
				Sampling date / time	30-May-2022 08:37	---	---	---	---
Compound	CAS Number	LOR	Unit		ES2218928-001	-----	-----	-----	-----
					Result	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	---	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	---	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	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: WATER (Matrix: WATER)				Sample ID	1200_MW024_220530	---	---	---	---
				Sampling date / time	30-May-2022 08:37	---	---	---	---
Compound	CAS Number	LOR	Unit		ES2218928-001	-----	-----	-----	-----
					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	%		111	---	---	---	---
13C8-PFOA	---	0.02	%		115	---	---	---	---

Surrogate Control Limits

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2218928**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: 60612561	Date Samples Received	: 31-May-2022
Order number	: -	Date Analysis Commenced	: 31-May-2022
C-O-C number	: 38287	Issue Date	: 07-Jun-2022
Sampler	: [redacted]		
Site	: NT_1200_PFASOMP		
Quote number	: SY/139/19 V3		
No. of samples received	: 2		
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*
[redacted]	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4379418)									
ES2219430-001	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
EP2206667-030	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: 4379418)									
ES2219430-001	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 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: 4379418) - continued									
EP2206667-030	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: 4379418)									
ES2219430-001	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
EP2206667-030	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: 4379418)									
ES2219430-001	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

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: 4379418) - continued									
ES2219430-001	Anonymous	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
EP2206667-030	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: 4379418)									
ES2219430-001	Anonymous	EP231X: Sum of PFAS	---	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2206667-030	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4379418)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	120	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	111	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4379418)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	84.4	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	112	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	110	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	109	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	114	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	118	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4379418)								
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	106	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	108	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.2	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	57.6	145
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	106	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4379418)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	121	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	110	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	95.0	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: 4379418) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	101	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4379418)							
EP2206532-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	117	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	124	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	112	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	115	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	119	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	120	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4379418)							
EP2206532-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	92.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	77.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	100	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	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	117	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	110	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	99.0	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	116	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	126	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4379418)							
EP2206532-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	115	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	129	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	104	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	107	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	92.9	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136

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: 4379418) - continued							
EP2206532-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	112	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4379418)							
EP2206532-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	115	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	113	71.4	144

REPORT OF ANALYSIS

Report No. RN1341391

Client	: AECOM AUSTRALIA PTY LTD	**Job No.**	: AECO06/220128
	LEVEL 8	**Quote No.**	: QT-02018
	540 WICKHAM STREET	**Order No.**	: 60612561_2_1
		Date Received	: 28-JAN-2022
Attention	:	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: [redacted]	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N22/001608	1200_QC200_220120	WATER 20/01/2022 03:51 PM

Lab Reg No.		N22/001608				
Date Sampled		20-JAN-2022				
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05				NR70
PFPeA (2706-90-3)	ug/L	<0.02				NR70
PFHxA (307-24-4)	ug/L	<0.01				NR70
PFHpA (375-85-9)	ug/L	<0.01				NR70
PFOA (335-67-1)	ug/L	<0.01				NR70
PFNA (375-95-1)	ug/L	<0.01				NR70
PFDA (335-76-2)	ug/L	<0.01				NR70
PFUdA (2058-94-8)	ug/L	<0.01				NR70
PFDoA (307-55-1)	ug/L	<0.01				NR70
PFTrDA (72629-94-8)	ug/L	<0.02				NR70
PFTeDA (376-06-7)	ug/L	<0.02				NR70
PFHxDA (67905-19-5)	ug/L	<0.02				NR70
PFODA (16517-11-6)	ug/L	<0.05				NR70
FOUEA (70887-84-2)	ug/L	<0.01				NR70
PFDS (335-77-3)	ug/L	<0.01				NR70
PFPeS (2706-91-4)	ug/L	<0.01				NR70
PFHxS (355-46-4)	ug/L	<0.01				NR70
PFHpS (375-92-8)	ug/L	<0.01				NR70
PFOS (1763-23-1)	ug/L	<0.02				NR70
PFNS (68259-12-1)	ug/L	<0.01				NR70
PFBS (375-73-5)	ug/L	<0.01				NR70
PFOSA (754-91-6)	ug/L	<0.01				NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02				NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02				NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01				NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01				NR70
N-MeFOSE (24448-09-7)	ug/L	<0.05				NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05				NR70
4:2 FTS (757124-72-4)	ug/L	<0.01				NR70
6:2 FTS (27619-97-2)	ug/L	<0.01				NR70

REPORT OF ANALYSIS

Report No. RN1341391

Lab Reg No.		N22/001608				
Date Sampled		20-JAN-2022				
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
8:2 FTS (39108-34-4)	ug/L	<0.01				NR70
10:2 FTS (120226-60-0)	ug/L	<0.01				NR70
8:2 diPAP (678-41-1)	ug/L	<0.02				NR70
PFBA (Surrogate Recovery)	%	107				NR70
PFPeA (Surrogate Recovery)	%	110				NR70
PFHxA (Surrogate Recovery)	%	102				NR70
PFHpA (Surrogate Recovery)	%	110				NR70
PFOA (Surrogate Recovery)	%	108				NR70
PFNA (Surrogate Recovery)	%	122				NR70
PFDA (Surrogate Recovery)	%	104				NR70
PFUdA (Surrogate Recovery)	%	121				NR70
PFDoA (Surrogate Recovery)	%	100				NR70
PFTeDA (Surrogate Recovery)	%	65				NR70
PFHxDA (Surrogate Recovery)	%	58				NR70
FOUEA (Surrogate Recovery)	%	90				NR70
PFBS (Surrogate Recovery)	%	109				NR70
PFHxS (Surrogate Recovery)	%	109				NR70
PFOS (Surrogate Recovery)	%	105				NR70
PFOSA (Surrogate Recovery)	%	115				NR70
N-MeFOSA (Surrogate Recovery)	%	67				NR70
N-EtFOSA (Surrogate Recovery)	%	61				NR70
N-MeFOSAA (Surrogate Recovery)	%	119				NR70
N-EtFOSAA (Surrogate Recovery)	%	89				NR70
N-MeFOSE (Surrogate Recovery)	%	66				NR70
N-EtFOSE (Surrogate Recovery)	%	58				NR70
4:2 FTS (Surrogate Recovery)	%	123				NR70
6:2 FTS (Surrogate Recovery)	%	103				NR70
8:2 FTS (Surrogate Recovery)	%	116				NR70
8:2 diPAP (Surrogate Recovery)	%	104				NR70
Dates						
Date extracted		1-FEB-2022				
Date analysed		1-FEB-2022				

N22/001608

PFOS and PFHxS are quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.

All results corrected for labelled surrogate recoveries.

REPORT OF ANALYSIS

Report No. RN1341391

Lab Reg No.		N22/001608				
Date Sampled		20-JAN-2022				
	Units					Method

[redacted]

Organics - NSW
Accreditation No. 198

04-FEB-2022

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) as received and tested.

This Report supersedes reports: *RN1341374*

Measurement Uncertainty is available upon request.
Chemical Accreditation 198: 105 Delhi Road, North Ryde, NSW, 2113

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/220128 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.05	<0.05	NA	NA	NA	115	NA
PFPeA (2706-90-3)	NR70	0.02	<0.02	NA	NA	NA	100	NA
PFHxA (307-24-4)	NR70	0.01	<0.01	NA	NA	NA	100	NA
PFHpA (375-85-9)	NR70	0.01	<0.01	NA	NA	NA	98	NA
PFOA (335-67-1)	NR70	0.01	<0.01	NA	NA	NA	92	NA
PFNA (375-95-1)	NR70	0.01	<0.01	NA	NA	NA	99	NA
PFDA (335-76-2)	NR70	0.01	<0.01	NA	NA	NA	86	NA
PFUdA (2058-94-8)	NR70	0.01	<0.01	NA	NA	NA	80	NA
PFDoA (307-55-1)	NR70	0.01	<0.01	NA	NA	NA	88	NA
PFTrDA (72629-94-8)	NR70	0.02	<0.02	NA	NA	NA	61	NA
PFTeDA (376-06-7)	NR70	0.02	<0.02	NA	NA	NA	94	NA
PFHxDA (67905-19-5)	NR70	0.02	<0.02	NA	NA	NA	123	NA
PFODA (16517-11-6)	NR70	0.05	<0.05	NA	NA	NA	143	NA
FOUEA (70887-84-2)	NR70	0.01	<0.01	NA	NA	NA	82	NA
PFBS (375-73-5)	NR70	0.01	<0.01	NA	NA	NA	102	NA
PFPeS (2706-91-4)	NR70	0.01	<0.01	NA	NA	NA	106	NA
PFHxS (355-46-4)	NR70	0.01	<0.01	NA	NA	NA	95	NA
PFHpS (375-92-8)	NR70	0.01	<0.01	NA	NA	NA	100	NA
PFOS (1763-23-1)	NR70	0.02	<0.02	NA	NA	NA	140	NA
PFNS (68259-12-1)	NR70	0.01	<0.01	NA	NA	NA	96	NA
PFDS (335-77-3)	NR70	0.01	<0.01	NA	NA	NA	109	NA
PFOSA (754-91-6)	NR70	0.01	<0.01	NA	NA	NA	94	NA
N-MeFOSA (31506-32-8)	NR70	0.02	<0.02	NA	NA	NA	88	NA
N-EtFOSA (4151-50-2)	NR70	0.02	<0.02	NA	NA	NA	102	NA
N-MeFOSAA (2355-31-9)	NR70	0.01	<0.01	NA	NA	NA	100	NA
N-EtFOSAA(2991-50-6)	NR70	0.01	<0.01	NA	NA	NA	95	NA
N-MeFOSE (24448-09-7)	NR70	0.05	<0.05	NA	NA	NA	73	NA
N-EtFOSE (1691-99-2)	NR70	0.05	<0.05	NA	NA	NA	76	NA
4:2 FTS (757124-72-4)	NR70	0.01	<0.01	NA	NA	NA	102	NA
6:2 FTS (27619-97-2)	NR70	0.01	<0.01	NA	NA	NA	100	NA
8:2 FTS (39108-34-4)	NR70	0.01	<0.01	NA	NA	NA	90	NA
10:2 FTS (120226-60-0)	NR70	0.01	<0.01	NA	NA	NA	93	NA
8:2 diPAP (678-41-1)	NR70	0.02	<0.02	NA	NA	NA	98	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed: [redacted]
Organics Manager, NMI-North Ryde
Date: **2/02/2022**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB2211961**	Page	: 1 of 5
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 29-Apr-2022
Site	: ---	Issue Date	: 09-May-2022
Sampler	: [redacted]	No. of samples received	: 5
Order number	: NT_1200_PFASOMP	No. of samples analysed	: 5

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

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

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	5	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
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 1200_QC200_220420	**20-Apr-2022**	**05-May-2022**	17-Oct-2022	✓	**05-May-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_QC201_220422, 1200_QC202_220422, 1200_QC203_220422	**22-Apr-2022**	**05-May-2022**	19-Oct-2022	✓	**05-May-2022**	19-Oct-2022	✓
HDPE (no PTFE) (EP231X-INJ) 1200_QC204_220422	**22-Apr-2022**	**06-May-2022**	19-Oct-2022	✓	**06-May-2022**	19-Oct-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 1200_QC200_220420	**20-Apr-2022**	**05-May-2022**	17-Oct-2022	✓	**05-May-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_QC201_220422, 1200_QC202_220422, 1200_QC203_220422	**22-Apr-2022**	**05-May-2022**	19-Oct-2022	✓	**05-May-2022**	19-Oct-2022	✓
HDPE (no PTFE) (EP231X-INJ) 1200_QC204_220422	**22-Apr-2022**	**06-May-2022**	19-Oct-2022	✓	**06-May-2022**	19-Oct-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 1200_QC200_220420	**20-Apr-2022**	**05-May-2022**	17-Oct-2022	✓	**05-May-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_QC201_220422, 1200_QC202_220422, 1200_QC203_220422	**22-Apr-2022**	**05-May-2022**	19-Oct-2022	✓	**05-May-2022**	19-Oct-2022	✓
HDPE (no PTFE) (EP231X-INJ) 1200_QC204_220422	**22-Apr-2022**	**06-May-2022**	19-Oct-2022	✓	**06-May-2022**	19-Oct-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
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_QC200_220420	**20-Apr-2022**	**05-May-2022**	17-Oct-2022	✓	**05-May-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC201_220422, 1200_QC202_220422, 1200_QC203_220422	**22-Apr-2022**	**05-May-2022**	19-Oct-2022	✓	**05-May-2022**	19-Oct-2022	✓
HDPE (no PTFE) (EP231X-INJ)							
1200_QC204_220422	**22-Apr-2022**	**06-May-2022**	19-Oct-2022	✓	**06-May-2022**	19-Oct-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_QC200_220420	**20-Apr-2022**	**05-May-2022**	17-Oct-2022	✓	**05-May-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC201_220422, 1200_QC202_220422, 1200_QC203_220422	**22-Apr-2022**	**05-May-2022**	19-Oct-2022	✓	**05-May-2022**	19-Oct-2022	✓
HDPE (no PTFE) (EP231X-INJ)							
1200_QC204_220422	**22-Apr-2022**	**06-May-2022**	19-Oct-2022	✓	**06-May-2022**	19-Oct-2022	✓

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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	5	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	5	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	8	**12.50**	**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
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.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with mobile phase solvent. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB2211961**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: [redacted]	Contact	: [redacted]
Address	: St Patricks Commercial Centre Queen Street SINGLETON NSW, AUSTRALIA 2330	Address	: [redacted] QLD Australia 4053
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 29-Apr-2022 13:00
Order number	: NT_1200_PFASOMP	Date Analysis Commenced	: 03-May-2022
C-O-C number	: —	Issue Date	: 09-May-2022 16:34
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/478/20 v3		
No. of samples received	: 5		
No. of samples analysed	: 5		

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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*
[redacted]	Senior Organic Chemist	Brisbane Organics, Stafford, QLD

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 Contact for details.

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

- EP231X - 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.
- 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.
- EP231X-INJ: The direct injection LCMSMS method may be used where the sample matrix is not suitable for Solid Phase Extraction (e.g. significant particulate load) or where only a single sample container is received.

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC200_220420	1200_QC201_220422	1200_QC202_220422	1200_QC203_220422	1200_QC204_220422
				Sampling date / time	20-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
					EB2211961-001	EB2211961-002	EB2211961-003	EB2211961-004	EB2211961-005
					Result	Result	Result	Result	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		--	---	---	---	**0.03**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		--	---	---	---	<0.02
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	**0.02**	**0.08**	<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**	**0.07**	**0.28**	<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	0.10	µg/L		--	---	---	---	<0.10
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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC200_220420	1200_QC201_220422	1200_QC202_220422	1200_QC203_220422	1200_QC204_220422
				Sampling date / time	20-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211961-001	EB2211961-002	EB2211961-003	EB2211961-004	EB2211961-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		--	---	---	---	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		--	---	---	---	<0.05
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	**0.06**	<0.02	<0.02	--
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.05**	**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	**0.02**	<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
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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC200_220420	1200_QC201_220422	1200_QC202_220422	1200_QC203_220422	1200_QC204_220422
				Sampling date / time	20-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211961-001	EB2211961-002	EB2211961-003	EB2211961-004	EB2211961-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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
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
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		---	---	---	---	**0.04**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC200_220420	1200_QC201_220422	1200_QC202_220422	1200_QC203_220422	1200_QC204_220422
				Sampling date / time	20-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
					EB2211961-001	EB2211961-002	EB2211961-003	EB2211961-004	EB2211961-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		--	---	---	---	**0.04**
Sum of PFAS (WA DER List)	---	0.01	µg/L		--	---	---	---	**0.04**
Sum of PFAS	---	0.01	µg/L		**0.01**	**0.20**	**0.40**	<0.01	--
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	**0.09**	**0.36**	<0.01	--
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.01**	**0.20**	**0.40**	<0.01	--
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**77.9**	**101**	**101**	**104**	--
13C4-PFOS	---	0.02	%		--	---	---	---	**102**
13C8-PFOA	---	0.02	%		**96.5**	**97.5**	**103**	**101**	--
13C8-PFOA	---	0.02	%		--	---	---	---	**96.4**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	**----**	65	140
13C8-PFOA	**----**	71	133

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB2211961**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: [redacted]	Contact	: [redacted]
Address	: St Patricks Commercial Centre Queen Street SINGLETON NSW, AUSTRALIA 2330	Address	: [redacted] QLD Australia 4053
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 29-Apr-2022
Order number	: NT_1200_PFASOMP	Date Analysis Commenced	: 03-May-2022
C-O-C number	: —	Issue Date	: 09-May-2022
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/478/20 v3		
No. of samples received	: 5		
No. of samples analysed	: 5		

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*
[redacted]	Senior Organic Chemist	Brisbane Organics, Stafford, QLD

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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4322322)									
EB2211807-001	Anonymous	EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.03	<0.03	0.0	No Limit
		EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: 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: 4322322)									
EB2211807-001	Anonymous	EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	0.06	0.0	No Limit
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.03	<0.03	0.0	No Limit
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	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 (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4322322) - continued									
EB2211807-001	Anonymous	EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	<0.10	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4322322)									
EB2211807-001	Anonymous	EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 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: 4322322)									
EB2211807-001	Anonymous	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 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: 4322322)									
EB2211807-001	Anonymous	EP231X-INJ: Sum of PFAS	---	0.01	µg/L	0.09	0.09	0.0	No Limit
		EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Sum of PFAS (WA DER List)	---	0.01	µg/L	0.09	0.09	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4319543)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	85.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	95.7	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	92.1	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	83.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	82.3	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	80.7	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4322322)								
EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.444 µg/L	93.5	72.0	130
EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.47 µg/L	74.7	71.0	127
EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.475 µg/L	79.4	68.0	131
EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.477 µg/L	79.0	69.0	134
EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.4646 µg/L	100	65.0	140
EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	89.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4319543)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	89.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	92.0	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	87.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	93.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	86.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	71.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	102	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4322322)								
EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	2.5 µg/L	91.1	73.0	129
EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	85.0	72.0	129
EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	86.6	72.0	129
EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	84.2	72.0	130
EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	92.4	71.0	133
EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	82.6	69.0	130
EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	80.8	71.0	129
EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	77.4	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: 4322322) - continued								
EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	76.6	72.0	134
EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	78.6	65.0	144
EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	94.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4319543)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	89.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	92.4	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	102	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	92.6	62.6	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	82.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4322322)								
EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	100	67.0	137
EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	85.8	68.0	141
EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	90.0	62.1	136
EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	85.3	65.2	135
EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	88.4	63.2	135
EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	80.0	65.0	136
EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	78.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4319543)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	93.5	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	86.6	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	88.8	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	92.3	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4322322)								
EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.469 µg/L	77.6	63.0	143
EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.476 µg/L	89.3	64.0	140
EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.48 µg/L	89.0	67.0	138
EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.483 µg/L	88.0	62.2	139
EP231P: PFAS Sums (QCLot: 4319543)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 4319543) - continued								
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: 4322322)								
EP231X-INJ: Sum of PFAS	---	0.01	µg/L	<0.01	---	---	---	---
EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	---	---	---	---
EP231X-INJ: 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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4322322)							
EB2211807-002	Anonymous	EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.443 µg/L	105	70.0	130
		EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.47 µg/L	90.8	70.0	130
		EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.475 µg/L	91.8	70.0	130
		EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.477 µg/L	89.1	70.0	130
		EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	103	70.0	130
		EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.482 µg/L	100	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4322322)							
EB2211807-002	Anonymous	EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	102	70.0	130
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	98.6	70.0	130
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	102	70.0	130
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	94.4	70.0	130
		EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	100	70.0	130
		EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	95.6	70.0	130
		EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	92.0	70.0	130
		EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	78.6	70.0	130
		EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	78.6	70.0	130
		EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	85.4	70.0	130
		EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	104	70.0	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4322322)							
EB2211807-002	Anonymous	EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	113	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: 4322322) - continued							
EB2211807-002	Anonymous	EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	97.7	70.0	130
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	106	70.0	130
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	90.4	70.0	130
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	99.8	70.0	130
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	88.2	70.0	130
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	82.6	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4322322)							
EB2211807-002	Anonymous	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.468 µg/L	86.5	70.0	130
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.475 µg/L	101	70.0	130
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.48 µg/L	99.4	70.0	130
		EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.483 µg/L	92.8	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2201970**	Page	: 1 of 4
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_3097_PFASOMP	Date Samples Received	: 27-Jan-2022
Site	: NT_3097_PFASOMP	Issue Date	: 01-Feb-2022
Sampler	: [redacted]	No. of samples received	: 3
Order number	: 60612562_2.1	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: **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)								
3097_SW086_220120, 3097_SW091_220120	3097_SW123_220120,	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
3097_SW086_220120, 3097_SW091_220120	3097_SW123_220120,	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
3097_SW086_220120, 3097_SW091_220120	3097_SW123_220120,	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
3097_SW086_220120, 3097_SW091_220120	3097_SW123_220120,	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
3097_SW086_220120, 3097_SW091_220120	3097_SW123_220120,	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓

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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

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
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2201970**	Page	: 1 of 5
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_3097_PFASOMP	Date Samples Received	: 27-Jan-2022 11:00
Order number	: 60612562_2.1	Date Analysis Commenced	: 28-Jan-2022
C-O-C number	: 32658	Issue Date	: 01-Feb-2022 09:07
Sampler	: [redacted]		
Site	: NT_3097_PFASOMP		
Quote number	: SY/139/19 v4 60612562_2.1		
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*
[redacted]	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 Contact for details.

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

- EP231X - 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.
- 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	3097_SW086_220120	3097_SW123_220120	3097_SW091_220120	---	---
				Sampling date / time	20-Jan-2022 10:48	20-Jan-2022 11:36	20-Jan-2022 12:09	---	---
Compound	CAS Number	LOR	Unit		ES2201970-001	ES2201970-002	ES2201970-003	-----	-----
					Result	Result	Result	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	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	**0.02**	**0.02**	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	---	---

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	3097_SW086_220120	3097_SW123_220120	3097_SW091_220120	---	---
				Sampling date / time	20-Jan-2022 10:48	20-Jan-2022 11:36	20-Jan-2022 12:09	---	---
Compound	CAS Number	LOR	Unit		ES2201970-001	ES2201970-002	ES2201970-003	-----	-----
					Result	Result	Result	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		<0.01	**0.03**	**0.02**	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.03**	**0.02**	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.03**	**0.02**	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**97.2**	**98.0**	**102**	---	---
13C8-PFOA	---	0.02	%		**106**	**102**	**108**	---	---

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2201970**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_3097_PFASOMP	Date Samples Received	: 27-Jan-2022
Order number	: 60612562_2.1	Date Analysis Commenced	: 28-Jan-2022
C-O-C number	: 32658	Issue Date	: 01-Feb-2022
Sampler	: [redacted]		
Site	: NT_3097_PFASOMP		
Quote number	: SY/139/19 v4 60612562_2.1		
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*
[redacted]	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4142997)									
ES2201970-002	3097_SW123_220120	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
ES2201971-010	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: 4142997)									
ES2201970-002	3097_SW123_220120	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 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: 4142997) - continued									
ES2201971-010	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: 4142997)									
ES2201970-002	3097_SW123_220120	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
ES2201971-010	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: 4142997)									
ES2201970-002	3097_SW123_220120	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	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: 4142997) - continued									
ES2201970-002	3097_SW123_220120	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
ES2201971-010	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: 4142997)									
ES2201970-002	3097_SW123_220120	EP231X: Sum of PFAS	---	0.01	µg/L	0.03	0.03	0.0	No Limit
ES2201971-010	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4142997)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	88.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	80.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	82.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	90.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4142997)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	78.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	81.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	85.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	81.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	89.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4142997)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	76.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	84.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	92.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	82.3	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	85.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4142997)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.0	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	82.4	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	94.4	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: 4142997) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	98.6	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4142997)							
ES2201971-010	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	103	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	92.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	88.8	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	82.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	82.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	90.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4142997)							
ES2201971-010	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	80.1	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	78.2	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	91.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	98.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	93.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	92.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	91.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	85.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	97.5	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4142997)							
ES2201971-010	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	96.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	82.6	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	88.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	101	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	95.6	65.0	136

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: 4142997) - continued							
ES2201971-010	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	96.9	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4142997)							
ES2201971-010	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	82.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	81.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	97.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	101	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2201971**	Page	: 1 of 5
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 27-Jan-2022
Site	: NT_1200_PFASOMP	Issue Date	: 01-Feb-2022
Sampler	: [redacted] [redacted]	No. of samples received	: 9
Order number	: 60612562_2.1	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.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW075_220120, 1200_QC100_220120, 1200_QC400_220120, 1200_QC500_220120, 1200_SW001_220120, 1200_SW007_220120, 1200_SW023_220120, 1200_SW059_220120, 1200_SW028_220120	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW075_220120, 1200_QC100_220120, 1200_QC400_220120, 1200_QC500_220120, 1200_SW001_220120, 1200_SW007_220120, 1200_SW023_220120, 1200_SW059_220120, 1200_SW028_220120	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
1200_SW075_220120, 1200_QC100_220120, 1200_QC400_220120, 1200_QC500_220120, 1200_SW001_220120, 1200_SW007_220120, 1200_SW023_220120, 1200_SW059_220120, 1200_SW028_220120	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW075_220120, 1200_QC100_220120, 1200_QC400_220120, 1200_QC500_220120, 1200_SW001_220120, 1200_SW007_220120, 1200_SW023_220120, 1200_SW059_220120, 1200_SW028_220120	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_SW075_220120, 1200_QC100_220120, 1200_QC400_220120, 1200_QC500_220120, 1200_SW001_220120, 1200_SW007_220120, 1200_SW023_220120, 1200_SW059_220120, 1200_SW028_220120	**20-Jan-2022**	**31-Jan-2022**	19-Jul-2022	✓	**31-Jan-2022**	19-Jul-2022	✓

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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

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
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2201971**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	[redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 27-Jan-2022 11:00
Order number	: 60612562_2.1	Date Analysis Commenced	: 28-Jan-2022
C-O-C number	: 32691	Issue Date	: 01-Feb-2022 08:56
Sampler	: [redacted], [redacted]		
Site	: NT_1200_PFASOMP		
Quote number	: SY/139/19 v4 60612562_2.1		
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*
[redacted]	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 Contact for details.

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

- EP231X - 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.
- 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	1200_SW075_220120	1200_QC100_220120	1200_QC400_220120	1200_QC500_220120	1200_SW001_220120
				Sampling date / time	20-Jan-2022 15:49	20-Jan-2022 15:50	20-Jan-2022 15:52	20-Jan-2022 15:53	20-Jan-2022 16:18
Compound	CAS Number	LOR	Unit		ES2201971-001	ES2201971-002	ES2201971-004	ES2201971-005	ES2201971-006
					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		**0.02**	**0.01**	<0.01	<0.01	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<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: SURFACE WATER (Matrix: WATER)				Sample ID	1200_SW075_220120	1200_QC100_220120	1200_QC400_220120	1200_QC500_220120	1200_SW001_220120
				Sampling date / time	20-Jan-2022 15:49	20-Jan-2022 15:50	20-Jan-2022 15:52	20-Jan-2022 15:53	20-Jan-2022 16:18
Compound	CAS Number	LOR	Unit		ES2201971-001	ES2201971-002	ES2201971-004	ES2201971-005	ES2201971-006
					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		**0.03**	**0.02**	<0.01	<0.01	**0.03**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**0.02**	<0.01	<0.01	**0.03**
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.03**	**0.02**	<0.01	<0.01	**0.03**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**111**	**106**	**95.0**	**106**	**99.3**
13C8-PFOA	---	0.02	%		**106**	**106**	**103**	**107**	**105**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	1200_SW007_220120	1200_SW023_220120	1200_SW059_220120	1200_SW028_220120	—
				Sampling date / time	20-Jan-2022 16:31	20-Jan-2022 16:47	20-Jan-2022 16:58	20-Jan-2022 17:22	--
Compound	CAS Number	LOR	Unit		ES2201971-007	ES2201971-008	ES2201971-009	ES2201971-010	----
					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: SURFACE WATER (Matrix: WATER)				Sample ID	1200_SW007_220120	1200_SW023_220120	1200_SW059_220120	1200_SW028_220120	---
				Sampling date / time	20-Jan-2022 16:31	20-Jan-2022 16:47	20-Jan-2022 16:58	20-Jan-2022 17:22	---
Compound	CAS Number	LOR	Unit		ES2201971-007	ES2201971-008	ES2201971-009	ES2201971-010	-----
					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	%		97.2	114	101	103	---
13C8-PFOA	---	0.02	%		105	105	113	108	---

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2201971**	Page	: 1 of 7
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 27-Jan-2022
Order number	: 60612562_2.1	Date Analysis Commenced	: 28-Jan-2022
C-O-C number	: 32691	Issue Date	: 01-Feb-2022
Sampler	: [redacted], [redacted]		
Site	: NT_1200_PFASOMP		
Quote number	: SY/139/19 v4 60612562_2.1		
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*
[redacted]	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4142997)									
ES2201970-002	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	0.02	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
ES2201971-010	1200_SW028_220120	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: 4142997)									
ES2201970-002	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

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: 4142997) - continued									
ES2201971-010	1200_SW028_220120	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: 4142997)									
ES2201970-002	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
ES2201971-010	1200_SW028_220120	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: 4142997)									
ES2201970-002	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

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: 4142997) - continued									
ES2201970-002	Anonymous	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
ES2201971-010	1200_SW028_220120	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: 4142997)									
ES2201970-002	Anonymous	EP231X: Sum of PFAS	---	0.01	µg/L	0.03	0.03	0.0	No Limit
ES2201971-010	1200_SW028_220120	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4142997)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	88.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	80.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	82.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	90.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4142997)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	78.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	81.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	85.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	81.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	89.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4142997)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	76.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	84.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	92.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	82.3	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	85.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4142997)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.0	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	82.4	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	94.4	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: 4142997) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	98.6	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4142997)							
ES2201971-010	1200_SW028_220120	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	103	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	92.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	88.8	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	82.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	82.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	90.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4142997)							
ES2201971-010	1200_SW028_220120	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	80.1	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	78.2	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	91.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	98.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	93.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	92.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	91.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	85.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	97.5	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4142997)							
ES2201971-010	1200_SW028_220120	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	96.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	82.6	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	88.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	101	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	95.6	65.0	136

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: 4142997) - continued							
ES2201971-010	1200_SW028_220120	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	96.9	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4142997)							
ES2201971-010	1200_SW028_220120	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	82.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	81.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	97.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	101	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2214158**	Page	: 1 of 11
Amendment	: **2**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 27-Apr-2022
Site	: ---	Issue Date	: 19-May-2022
Sampler	: [redacted]	No. of samples received	: 46
Order number	: 60612561/2.1	No. of samples analysed	: 46

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES2214091--021	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES2214091--021	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES2214091--021	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES2214091--021	Anonymous	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES2214091--021	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2214091--021	Anonymous	**Perfluorobutanoic acid (PFBA)**	375-22-4	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2214091--021	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2214091--021	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2214091--021	Anonymous	**Perfluoroheptanoic acid (PFHpA)**	375-85-9	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2214091--021	Anonymous	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231C: Perfluoroalkyl Sulfonamides	ES2214091--021	Anonymous	**N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)**	24448-09-7	67.3 %	68.7-130%	**Recovery less than lower data quality objective**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	ES2214091--021	Anonymous	**6:2 Fluorotelomer sulfonic acid (6:2 FTS)**	27619-97-2	Not Determined	---	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
1200_SD028_220420, 1200_SD023_220420	**20-Apr-2022**	**----**	**----**	**---**	**02-May-2022**	04-May-2022	✓
HDPE Soil Jar (EA055)							
1200_SD086_220421, 1200_SD123_220421, 1200_SD091_220421, 1200_SD075_220421, 1200_SD059_220421, 1200_SD007_220421, 1200_SD001_220421	**21-Apr-2022**	**----**	**----**	**---**	**02-May-2022**	05-May-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
1200_SD028_220420, 1200_SD023_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
HDPE Soil Jar (EP231X)							
1200_SD007_220421, 1200_SD001_220421	**21-Apr-2022**	**02-May-2022**	18-Oct-2022	✓	**02-May-2022**	11-Jun-2022	✓
HDPE Soil Jar (EP231X)							
1200_SD086_220421, 1200_SD123_220421, 1200_SD091_220421, 1200_SD075_220421, 1200_SD059_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
1200_SD028_220420, 1200_SD023_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
HDPE Soil Jar (EP231X)							
1200_SD007_220421, 1200_SD001_220421	**21-Apr-2022**	**02-May-2022**	18-Oct-2022	✓	**02-May-2022**	11-Jun-2022	✓
HDPE Soil Jar (EP231X)							
1200_SD086_220421, 1200_SD123_220421, 1200_SD091_220421, 1200_SD075_220421, 1200_SD059_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
1200_SD028_220420, 1200_SD023_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
HDPE Soil Jar (EP231X)							
1200_SD007_220421, 1200_SD001_220421	**21-Apr-2022**	**02-May-2022**	18-Oct-2022	✓	**02-May-2022**	11-Jun-2022	✓
HDPE Soil Jar (EP231X)							
1200_SD086_220421, 1200_SD123_220421, 1200_SD091_220421, 1200_SD075_220421, 1200_SD059_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 1200_SD028_220420, 1200_SD023_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
HDPE Soil Jar (EP231X) 1200_SD007_220421, 1200_SD001_220421	**21-Apr-2022**	**02-May-2022**	18-Oct-2022	✓	**02-May-2022**	11-Jun-2022	✓
HDPE Soil Jar (EP231X) 1200_SD086_220421, 1200_SD123_220421, 1200_SD091_220421, 1200_SD075_220421, 1200_SD059_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 1200_SD028_220420, 1200_SD023_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**01-May-2022**	08-Jun-2022	✓
HDPE Soil Jar (EP231X) 1200_SD007_220421, 1200_SD001_220421	**21-Apr-2022**	**02-May-2022**	18-Oct-2022	✓	**02-May-2022**	11-Jun-2022	✓
HDPE Soil Jar (EP231X) 1200_SD086_220421, 1200_SD123_220421, 1200_SD091_220421, 1200_SD075_220421, 1200_SD059_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	08-Jun-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

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) 1200_MW029_220420, 1200_MW030_220420, 1200_QC300_220420, 1200_QC400_220420, 1200_MW021_220420, 1200_MW021D_220420, 1200_MW024_220420, 1200_QC100_220420, 1200_QC500_220420, 1200_MW018_220420, 1200_MW032_220420, 1200_MW031_220420, 1200_MW001_220420, 1200_MW004D_220420, 1200_MW012D_220420, 1200_MW012_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**29-Apr-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_SW086_220421, 1200_SW123_220421, 1200_SW091_220421, 1200_SW059_220421, 1200_SW007_220421, 1200_QC301_220421, 1200_QC401_220421, 1200_SW001_220421, 1200_MW034_220422, 1200_MW066_220422, 1200_MW080_220422, 1200_MW004_220422, 1200_QC104_220422	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_SW075_220421, 1200_MW113_220421, 1200_MW112_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**29-Apr-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_QC101_220422, 1200_QC102_220422, 1200_QC103_220422, 1200_QC302_220422, 1200_QC402_220422	**22-Apr-2022**	**29-Apr-2022**	19-Oct-2022	✓	**01-May-2022**	19-Oct-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
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW029_220420, 1200_MW030_220420, 1200_QC300_220420, 1200_QC400_220420, 1200_MW021_220420, 1200_MW021D_220420, 1200_MW024_220420, 1200_QC100_220420, 1200_QC500_220420, 1200_MW018_220420, 1200_MW032_220420, 1200_MW031_220420, 1200_MW001_220420, 1200_MW004D_220420, 1200_MW012D_220420, 1200_MW012_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**29-Apr-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_SW086_220421, 1200_SW123_220421, 1200_SW091_220421, 1200_SW059_220421, 1200_SW007_220421, 1200_QC301_220421, 1200_QC401_220421, 1200_SW001_220421, 1200_MW034_220422, 1200_MW066_220422, 1200_MW080_220422, 1200_MW004_220422, 1200_QC104_220422	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_SW075_220421, 1200_MW113_220421, 1200_MW112_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**29-Apr-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC101_220422, 1200_QC102_220422, 1200_QC103_220422, 1200_QC302_220422, 1200_QC402_220422	**22-Apr-2022**	**29-Apr-2022**	19-Oct-2022	✓	**01-May-2022**	19-Oct-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
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 1200_MW029_220420, 1200_MW030_220420, 1200_QC300_220420, 1200_QC400_220420, 1200_MW021_220420, 1200_MW021D_220420, 1200_MW024_220420, 1200_QC100_220420, 1200_QC500_220420, 1200_MW018_220420, 1200_MW032_220420, 1200_MW031_220420, 1200_MW001_220420, 1200_MW004D_220420, 1200_MW012D_220420, 1200_MW012_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**29-Apr-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_SW086_220421, 1200_SW123_220421, 1200_SW091_220421, 1200_SW059_220421, 1200_SW007_220421, 1200_QC301_220421, 1200_QC401_220421, 1200_SW001_220421, 1200_MW034_220422, 1200_MW066_220422, 1200_MW080_220422, 1200_MW004_220422, 1200_QC104_220422	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_SW075_220421, 1200_MW113_220421, 1200_MW112_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**29-Apr-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X) 1200_QC101_220422, 1200_QC102_220422, 1200_QC103_220422, 1200_QC302_220422, 1200_QC402_220422	**22-Apr-2022**	**29-Apr-2022**	19-Oct-2022	✓	**01-May-2022**	19-Oct-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
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW029_220420, 1200_MW030_220420, 1200_QC300_220420, 1200_QC400_220420, 1200_MW021_220420, 1200_MW021D_220420, 1200_MW024_220420, 1200_QC100_220420, 1200_QC500_220420, 1200_MW018_220420, 1200_MW032_220420, 1200_MW031_220420, 1200_MW001_220420, 1200_MW004D_220420, 1200_MW012D_220420, 1200_MW012_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**29-Apr-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_SW086_220421, 1200_SW123_220421, 1200_SW091_220421, 1200_SW059_220421, 1200_SW007_220421, 1200_QC301_220421, 1200_QC401_220421, 1200_SW001_220421, 1200_MW034_220422, 1200_MW066_220422, 1200_MW080_220422, 1200_MW004_220422, 1200_QC104_220422	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_SW075_220421, 1200_MW113_220421, 1200_MW112_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**29-Apr-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC101_220422, 1200_QC102_220422, 1200_QC103_220422, 1200_QC302_220422, 1200_QC402_220422	**22-Apr-2022**	**29-Apr-2022**	19-Oct-2022	✓	**01-May-2022**	19-Oct-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_MW029_220420, 1200_MW030_220420, 1200_QC300_220420, 1200_QC400_220420, 1200_MW021_220420, 1200_MW021D_220420, 1200_MW024_220420, 1200_QC100_220420, 1200_QC500_220420, 1200_MW018_220420, 1200_MW032_220420, 1200_MW031_220420, 1200_MW001_220420, 1200_MW004D_220420, 1200_MW012D_220420, 1200_MW012_220420	**20-Apr-2022**	**29-Apr-2022**	17-Oct-2022	✓	**29-Apr-2022**	17-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_SW086_220421, 1200_SW123_220421, 1200_SW091_220421, 1200_SW059_220421, 1200_SW007_220421, 1200_QC301_220421, 1200_QC401_220421, 1200_SW001_220421, 1200_MW034_220422, 1200_MW066_220422, 1200_MW080_220422, 1200_MW004_220422, 1200_QC104_220422	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**01-May-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_SW075_220421, 1200_MW113_220421, 1200_MW112_220421	**21-Apr-2022**	**29-Apr-2022**	18-Oct-2022	✓	**29-Apr-2022**	18-Oct-2022	✓
HDPE (no PTFE) (EP231X)							
1200_QC101_220422, 1200_QC102_220422, 1200_QC103_220422, 1200_QC302_220422, 1200_QC402_220422	**22-Apr-2022**	**29-Apr-2022**	19-Oct-2022	✓	**01-May-2022**	19-Oct-2022	✓

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	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	5.13	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.
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
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.
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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2214158**	Page	: 1 of 23
Amendment	: **2**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 27-Apr-2022 12:00
Order number	: 60612561/2.1	Date Analysis Commenced	: 28-Apr-2022
C-O-C number	: —	Issue Date	: 19-May-2022 16:12
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/478/20 v3		
No. of samples received	: 46		
No. of samples analysed	: 46		

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*
[redacted]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	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.

- EP231X: Poor matrix spike recovery due to matrix interferences.
- 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.
- Amendment (18/05/2022): This report has been amended as a result of a request to change sample identification numbers (IDs) received from [redacted] on 18/5/22, for sample 21. All analysis results are as per the previous report.
- Amendment (18/05/2022): This report has been amended as a result of a request to change sample identification numbers (IDs) received from [redacted] on 19/5/22, for sample 17, 18. All analysis results are as per the previous report.
- 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: SOIL (Matrix: SOIL)				Sample ID	1200_SD028_220420	1200_SD023_220420	1200_SD086_220421	1200_SD123_220421	1200_SD091_220421
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-017	ES2214158-018	ES2214158-023	ES2214158-025	ES2214158-026
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	0.1	%		**20.8**	**9.6**	**15.2**	**28.6**	**24.2**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	**0.0005**	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0045**	**0.0007**	<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	**0.0004**	<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: SOIL (Matrix: SOIL)				Sample ID	1200_SD028_220420	1200_SD023_220420	1200_SD086_220421	1200_SD123_220421	1200_SD091_220421
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-017	ES2214158-018	ES2214158-023	ES2214158-025	ES2214158-026
					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		<0.0002	<0.0002	**0.0050**	**0.0011**	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0050**	**0.0007**	<0.0002
Sum of PFAS (WA DER List)	---	0.0002	mg/kg		<0.0002	<0.0002	**0.0050**	**0.0011**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		**108**	**104**	**112**	**112**	**94.0**
13C8-PFOA	---	0.0002	%		**110**	**106**	**106**	**106**	**104**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	1200_SD075_220421	1200_SD059_220421	1200_SD007_220421	1200_SD001_220421	---
			Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	---
Compound	CAS Number	LOR	Unit	ES2214158-028	ES2214158-030	ES2214158-031	ES2214158-036	-----
				Result	Result	Result	Result	---
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	---	0.1	%	**43.3**	**14.8**	**34.4**	**23.6**	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0013**	<0.0002	<0.0002	<0.0002	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0013**	**0.0004**	<0.0002	**0.0003**	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	---
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	---

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1200_SD075_220421	1200_SD059_220421	1200_SD007_220421	1200_SD001_220421	---
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	---
Compound	CAS Number	LOR	Unit		ES2214158-028	ES2214158-030	ES2214158-031	ES2214158-036	-----
					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	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.0002	mg/kg		**0.0026**	**0.0004**	<0.0002	**0.0003**	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0013**	**0.0004**	<0.0002	**0.0003**	---
Sum of PFAS (WA DER List)	---	0.0002	mg/kg		**0.0013**	**0.0004**	<0.0002	**0.0003**	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		**109**	**114**	**92.0**	**93.0**	---
13C8-PFOA	---	0.0002	%		**102**	**103**	**91.0**	**93.5**	---

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW029_220420	1200_MW030_220420	1200_QC300_220420	1200_QC400_220420	1200_MW021_220420
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
					ES2214158-001	ES2214158-002	ES2214158-003	ES2214158-004	ES2214158-005
					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	**0.04**	<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	**0.10**	<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: WATER (Matrix: WATER)				Sample ID	1200_MW029_220420	1200_MW030_220420	1200_QC300_220420	1200_QC400_220420	1200_MW021_220420
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-001	ES2214158-002	ES2214158-003	ES2214158-004	ES2214158-005
					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	**0.14**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.14**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.14**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**106**	**107**	**104**	**113**	**99.6**
13C8-PFOA	---	0.02	%		**101**	**96.9**	**93.1**	**102**	**95.0**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW021D_220420	1200_MW024_220420	1200_QC100_220420	1200_QC500_220420	1200_MW018_220420
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
					ES2214158-006	ES2214158-007	ES2214158-008	ES2214158-009	ES2214158-010
					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: WATER (Matrix: WATER)				Sample ID	1200_MW021D_220420	1200_MW024_220420	1200_QC100_220420	1200_QC500_220420	1200_MW018_220420
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-006	ES2214158-007	ES2214158-008	ES2214158-009	ES2214158-010
					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	%		**109**	**106**	**99.3**	**108**	**112**
13C8-PFOA	---	0.02	%		**96.0**	**97.5**	**92.0**	**98.7**	**102**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW032_220420	1200_MW031_220420	1200_MW001_220420	1200_MW004D_220420	1200_MW012D_220420
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
					ES2214158-011	ES2214158-012	ES2214158-013	ES2214158-014	ES2214158-015
					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		**0.03**	<0.01	**0.04**	<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		**0.06**	<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		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.08**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.05**	<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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW032_220420	1200_MW031_220420	1200_MW001_220420	1200_MW004D_220420	1200_MW012D_220420
				Sampling date / time	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
					ES2214158-011	ES2214158-012	ES2214158-013	ES2214158-014	ES2214158-015
					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		**0.24**	<0.01	**0.12**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.09**	<0.01	**0.12**	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.24**	<0.01	**0.12**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**95.9**	**103**	**103**	**104**	**99.6**
13C8-PFOA	---	0.02	%		**97.2**	**94.5**	**97.7**	**105**	**94.2**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW012_220420	1200_SW075_220421	1200_MW113_220421	1200_MW112_220421	1200_SW086_220421
				Sampling date / time	20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
					ES2214158-016	ES2214158-019	ES2214158-020	ES2214158-021	ES2214158-022
					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: WATER (Matrix: WATER)				Sample ID	1200_MW012_220420	1200_SW075_220421	1200_MW113_220421	1200_MW112_220421	1200_SW086_220421
				Sampling date / time	20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-016	ES2214158-019	ES2214158-020	ES2214158-021	ES2214158-022
					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	%		**100**	**108**	**104**	**101**	**98.0**
13C8-PFOA	---	0.02	%		**101**	**101**	**94.5**	**98.5**	**103**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_SW123_220421	1200_SW091_220421	1200_SW059_220421	1200_SW007_220421	1200_QC301_220421
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
					ES2214158-024	ES2214158-027	ES2214158-029	ES2214158-032	ES2214158-033
					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		**0.02**	**0.01**	**0.07**	<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		**0.02**	**0.02**	**0.18**	<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: WATER (Matrix: WATER)				Sample ID	1200_SW123_220421	1200_SW091_220421	1200_SW059_220421	1200_SW007_220421	1200_QC301_220421
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-024	ES2214158-027	ES2214158-029	ES2214158-032	ES2214158-033
					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		**0.04**	**0.03**	**0.27**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	**0.03**	**0.25**	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.04**	**0.03**	**0.27**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**106**	**95.9**	**96.9**	**101**	**105**
13C8-PFOA	---	0.02	%		**100**	**98.9**	**104**	**98.8**	**103**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC401_220421	1200_SW001_220421	1200_QC101_220422	1200_QC102_220422	1200_QC103_220422
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
					ES2214158-034	ES2214158-035	ES2214158-037	ES2214158-038	ES2214158-039
					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	**0.03**	**0.08**	<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	**0.02**	**0.06**	**0.29**	<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	**0.05**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.05**	**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: WATER (Matrix: WATER)				Sample ID	1200_QC401_220421	1200_SW001_220421	1200_QC101_220422	1200_QC102_220422	1200_QC103_220422
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-034	ES2214158-035	ES2214158-037	ES2214158-038	ES2214158-039
					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	**0.02**	**0.21**	**0.40**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	**0.09**	**0.37**	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.02**	**0.21**	**0.40**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**98.7**	**96.7**	**100**	**103**	**102**
13C8-PFOA	---	0.02	%		**93.2**	**102**	**99.7**	**102**	**100**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC302_220422	1200_QC402_220422	1200_MW034_220422	1200_MW066_220422	1200_MW080_220422
				Sampling date / time	22-Apr-2022 00:00	22-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
					ES2214158-040	ES2214158-041	ES2214158-042	ES2214158-043	ES2214158-044
					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	**0.03**	**0.08**	<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	**0.05**	**0.34**	<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	**0.06**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.05**	**0.03**	<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	**0.02**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC302_220422	1200_QC402_220422	1200_MW034_220422	1200_MW066_220422	1200_MW080_220422
				Sampling date / time	22-Apr-2022 00:00	22-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		ES2214158-040	ES2214158-041	ES2214158-042	ES2214158-043	ES2214158-044
					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	**0.21**	**0.47**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.08**	**0.42**	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	<0.01	**0.21**	**0.47**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**91.4**	**93.9**	**97.7**	**100**	**98.1**
13C8-PFOA	---	0.02	%		**98.9**	**100**	**95.6**	**102**	**99.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW004_220422	1200_QC104_220422	---	---	---
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2214158-045	ES2214158-046	-----	-----	-----
					Result	Result	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	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		**0.03**	**0.04**	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW004_220422	1200_QC104_220422	---	---	---
				Sampling date / time	21-Apr-2022 00:00	21-Apr-2022 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2214158-045	ES2214158-046	------	------	------
					Result	Result	---	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		**0.04**	**0.05**	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	**0.05**	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.04**	**0.05**	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**92.6**	**109**	---	---	---
13C8-PFOA	---	0.02	%		**96.6**	**98.7**	---	---	---

Surrogate Control Limits

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

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2214158**	Page	: 1 of 18
Amendment	: **2**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 27-Apr-2022
Order number	: 60612561/2.1	Date Analysis Commenced	: 28-Apr-2022
C-O-C number	: —	Issue Date	: 19-May-2022
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/478/20 v3		
No. of samples received	: 46		
No. of samples analysed	: 46		

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
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	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: 4313693)									
ES2214158-023	1200_SD086_220421	EA055: Moisture Content	---	0.1	%	15.2	15.4	1.4	0% - 20%
ES2214447-005	Anonymous	EA055: Moisture Content	---	0.1	%	11.2	12.1	7.3	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4311983)									
ES2214091-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	1.83	1.94	5.8	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	3.06	3.37	9.5	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	20.2	20.2	0.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.334	0.343	2.8	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	3.53	3.57	1.1	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2214091-053	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0033	0.0032	0.0	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0036	0.0036	0.0	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0406	0.0381	6.5	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0035	0.0031	12.2	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.528	0.474	10.9	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0526	0.0492	6.7	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4313564)									
ES2214158-031	1200_SD007_220421	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: 4311983)									

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: 4311983) - continued									
ES2214091-021	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.554	0.589	6.2	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	2.36	2.65	11.5	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.340	0.351	3.0	0% - 20%
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.811	0.862	6.1	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0020	0.0018	8.5	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	0.304	0.311	2.3	0% - 20%
ES2214091-053	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0026	0.0025	4.5	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0084	0.0076	10.4	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0010	0.0010	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0039	0.0035	11.0	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0014	0.0012	19.7	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0011	0.0010	10.2	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0022	0.0023	0.0	0% - 50%
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0027	0.0030	13.6	0% - 50%
		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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4313564)									
ES2214158-031	1200_SD007_220421	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: 4311983)									
ES2214091-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	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 (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4311983) - continued									
ES2214091-021	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
ES2214091-053	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0165	0.0162	1.7	0% - 20%
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4313564)									
ES2214158-031	1200_SD007_220421	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: 4311983)									
ES2214091-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	0.0011	0.0011	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.114	0.112	1.2	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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4311983) - continued									
ES2214091-021	Anonymous	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
ES2214091-053	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4313564)									
ES2214158-031	1200_SD007_220421	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

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: 4310898)									
ES2214158-001	1200_MW029_220420	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
ES2214158-011	1200_MW032_220420	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.06	0.05	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: 4311999)									
ES2214158-024	1200_SW123_220421	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.03	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	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 (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4311999) - continued									
ES2214158-024	1200_SW123_220421	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
ES2214158-035	1200_SW001_220421	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4310898)									
ES2214158-001	1200_MW029_220420	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
ES2214158-011	1200_MW032_220420	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	0.08	0.08	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.05	0.06	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: 4311999)									
ES2214158-024	1200_SW123_220421	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

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: 4311999) - continued									
ES2214158-024	1200_SW123_220421	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
ES2214158-035	1200_SW001_220421	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: 4310898)									
ES2214158-001	1200_MW029_220420	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
ES2214158-011	1200_MW032_220420	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

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: 4310898) - continued									
ES2214158-011	1200_MW032_220420	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: 4311999)									
ES2214158-024	1200_SW123_220421	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
ES2214158-035	1200_SW001_220421	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: 4310898)									
ES2214158-001	1200_MW029_220420	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
ES2214158-011	1200_MW032_220420	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	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: 4310898) - continued									
ES2214158-011	1200_MW032_220420	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: 4311999)									
ES2214158-024	1200_SW123_220421	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
ES2214158-035	1200_SW001_220421	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: 4310898)									
ES2214158-001	1200_MW029_220420	EP231X: Sum of PFAS	---	0.01	µg/L	<0.01	<0.01	0.0	No Limit
ES2214158-011	1200_MW032_220420	EP231X: Sum of PFAS	---	0.01	µg/L	0.24	0.24	0.0	0% - 20%
EP231P: PFAS Sums (QC Lot: 4311999)									
ES2214158-024	1200_SW123_220421	EP231X: Sum of PFAS	---	0.01	µg/L	0.04	0.05	22.2	No Limit
ES2214158-035	1200_SW001_220421	EP231X: Sum of PFAS	---	0.01	µg/L	0.02	0.02	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: 4311983)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4313564)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4311983)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	94.1	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	114	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4313564)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	77.3	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	64.0	136

Sub-Matrix: **SOIL**

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: 4313564) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.6	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4311983)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	111	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4313564)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.9	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.9	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.0	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.4	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4311983)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.4	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	112	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	104	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	77.2	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4313564)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.4	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	83.2	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	110	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	69.2	143

Sub-Matrix: **WATER**

	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
		Spike	Spike Recovery (%)	Acceptable Limits (%)

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: 4310898)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	112	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4311999)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	87.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	84.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.4	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	79.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4310898)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	117	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	119	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	109	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4311999)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	95.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	98.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	93.2	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	101	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	90.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	97.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4310898)								

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: 4310898) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	118	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	108	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	123	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	117	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	113	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4311999)								
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	93.3	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	87.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.8	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	95.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4310898)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	110	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	121	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	119	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	116	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4311999)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	92.4	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	106	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	83.8	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	81.0	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: **SOIL**

Matrix Spike (MS) Report

Sub-Matrix: **SOIL**

				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: 4311983)							
ES2214091-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	# Not Determined	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	# Not Determined	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	# Not Determined	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	# Not Determined	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	112	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4313564)							
ES2214158-031	1200_SD007_220421	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	89.2	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	93.6	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	90.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	85.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	92.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4311983)							
ES2214091-021	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	# Not Determined	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	# Not Determined	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# Not Determined	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	# Not Determined	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	# Not Determined	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	108	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	124	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	116	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	112	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	108	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	102	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4313564)							
ES2214158-031	1200_SD007_220421	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	83.7	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	100	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.4	70.0	132

Sub-Matrix: **SOIL**

				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: 4313564) - continued							
ES2214158-031	1200_SD007_220421	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	92.0	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	97.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	103	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	97.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	93.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	107	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	98.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4311983)							
ES2214091-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	83.3	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	80.1	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	# 67.3	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	104	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	96.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	88.0	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4313564)							
ES2214158-031	1200_SD007_220421	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	106	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	90.4	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	82.0	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	77.2	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	88.0	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	91.2	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	92.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4311983)							
ES2214091-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	128	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	# Not Determined	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	112	65.0	137

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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4311983) - continued							
ES2214091-021	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	116	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4313564)							
ES2214158-031	1200_SD007_220421	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	91.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	92.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	106	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	75.2	69.2	143

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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4310898)							
ES2214158-002	1200_MW030_220420	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	110	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	117	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	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	107	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	102	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4311999)							
ES2214158-022	1200_SW086_220421	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	90.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	93.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	86.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	95.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	95.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	83.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4310898)							
ES2214158-002	1200_MW030_220420	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	96.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	120	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	117	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	110	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	117	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	125	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	119	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	111	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	125	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	106	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4311999)							
ES2214158-022	1200_SW086_220421	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	87.8	73.0	129

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: 4311999) - continued							
ES2214158-022	1200_SW086_220421	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	98.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	96.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	99.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	95.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	92.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	93.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	89.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	84.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	94.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4310898)							
ES2214158-002	1200_MW030_220420	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	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	112	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	117	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	121	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	123	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	119	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4311999)							
ES2214158-022	1200_SW086_220421	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	90.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	88.1	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	96.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4310898)							
ES2214158-002	1200_MW030_220420	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	110	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	116	64.0	140

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: 4310898) - continued							
ES2214158-002	1200_MW030_220420	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	121	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	114	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4311999)							
ES2214158-022	1200_SW086_220421	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	97.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	113	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	92.6	71.4	144

Appendix G

Calibration Certificate

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 18J100253

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		10640	0 ppm
2. Conductivity		2760uS		329027	2760uS
3. pH7		pH 7.00		330737	pH 7.0
4. pH4		pH 4.00		330734	pH 4.0
5. ORP mV		231mV		333082/329762	240 mV
7. Temp °C		19.5		Multimeter	19,5

Calibrated by: [redacted]

Calibration date: 3-Dec-21

Next calibration due: 1-Jun-22

AECOM

ANZ

FQM - Water Quality Meter Calibration Record

Q4AN(EV)-410-FM1

Project Name:	WQMP/PFASOMP	**Project Number:**	–
Project Location:	Robertson Barracks	**Client:**	Ventia / DoD
PM Name:	[redacted]	**Fieldwork Staff Name:**	[redacted]

This calibration record is intended to prompt fieldwork staff to calibrate water quality meter (WQM) daily before the start of fieldworks.

INSTRUMENT DETAILS

Supplier:	–
Make and Model:	YSI Professional - AECOM S.
Serial Number:	–

CALIBRATION

CALIBRATE WITH CALIBRATION SOLUTIONS

Date and Time:	20.04.22				
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:	4.0	7.0	1413		
Calibration Reading:	4.02	6.98	1413		
Calibration Temperature:	23.3	23.5	24.2		

ONGOING CHECKS

BUMP TEST WITH CALIBRATION SOLUTION

Date and Time:	26-04-22				
Parameter	Acidity		Conductivity	Dissolved Oxygen	
Units	pH	pH	µS/cm	ppm	ppm
Calibration Standard Concentration:	4.00	7.0	1413		
Bump Test Reading:	3.96	6.95 *	1512 *		
Bump Test Temperature:	23.3	23.4	23.3		

COMMENTS

Detail any equipment faults, minor maintenance performed, change of batteries or technical support provided.

* calibrated back to standard after.

Redox = 240 mV @ 23.2 °C

Approval and Distribution

☑ Each individual instrument has been inspected and calibrated daily and bump tested as required by fieldwork staff.

[redacted]
Fieldwork Staff Signature

26-04-22
Date

Distribution: Project Central File

Prepared for
Department of Defence Directorate of PFAS Remediation Environment and Engineering Branch
ABN: 68706814312

AECOM

Sampling Event Factual Report, End of Dry Season 2022

PFAS OMP - Robertson Barracks

06-Feb-2023
PFAS Ongoing Monitoring Plan

Art by
Bianca Gardiner Dodd

aecom.com

Delivering a better world

Delivering a better world

Sampling Event Factual Report, End of Dry Season 2022

PFAS OMP - Robertson Barracks

Client: Department of Defence Directorate of PFAS Remediation Environment and Engineering Branch

ABN: 68706814312

Prepared by

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ABN 20 093 846 925

06-Feb-2023

Job No.: 60612561

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document	Sampling Event Factual Report, End of Dry Season 2022
Ref	60612561_ROB_End of Dry 2022 Factual Report_Rev 0.docx
Date	06-Feb-2023
Prepared by	[redacted]
Reviewed by	

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	16-Jan-2023	Final	[redacted] Project Manager	[redacted]

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Abbreviations

Term	Description
AECOM	AECOM Australia Pty Ltd
ALS	ALS Environmental Pty Ltd
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
AS/ANZ	Australia/New Zealand Standard®
DCMM	Defence Contamination Management Manual
DO	Dissolved oxygen
DoH	Department of Health
DQO	Data quality objectives
DQI	Data quality indicators
EC	Electrical conductivity
HEPA	Heads of Environmental Protection Agencies
LOR	Limit of reporting
NATA	National Association of Testing Authorities
NEMP 2.0	National Environmental Management Plan
NHMRC	National Health and Medical Research Council
NMI	National Measurement Institute
NT	Northern Territory
NSW	New South Wales
OMP	Ongoing Monitoring Plan
ORP	Oxidation-reduction potential
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
QA/QC	Quality Assurance/Quality Control
SBRS	Shoal Bay Receiving Station
SAQP	Sampling Analysis Quality Plan
SWL	Standing Water Level

List of Units

Unit	Definition	Unit	Definition
°C	Degrees Celsius	mg	Miligrams
cm	Centimetre	mV	Millivolts
L	Litre	µg	Micrograms
m	Metre	µS	Microsiemens
mAHD	metres Australian Height Datum	NTU	Nephelometric Turbidity Unit
mbtoc	metres below top of casing		

1.0 Introduction

1.1 General

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) outlined in the *PFAS Management Area Plan (PMAP)* (Department of Defence, 2018) at Robertson Barracks (the 'Base') in the Northern Territory (NT). The location of the Base and Management Area is shown in **Figure 1** in **Appendix A**. The OMP (Senversa, 2018) for the Base outlines the requirement to complete groundwater and surface water sampling biannually, and sediment sampling annually.

The primary purpose of the OMP (Senversa, 2018) is to monitor changes to the PFAS impact in groundwater, surface water, and sediment pathways associated with sources of PFAS as initially assessed through the detailed site investigation phase of works. Changes may result from the specific or cumulative impact of remediation or containment actions, existing transportation trends, and changes to hydrogeology or weather events.

The monitoring plan at Robertson Barracks includes a regime of groundwater, surface water, and sediment sampling to capture these changes in the long term, to enable Defence to maintain an up-to-date understanding of temporal and spatial distribution, concentration and transport of PFAS contaminants.

This report details the scope and findings of end of dry season monitoring activities including groundwater sampling conducted in September 2022.

1.2 Objectives

As noted above, the objective of the PFAS OMP (Senversa, 2018) is to provide information on changes to PFAS contamination originating from Defence property to inform risk management decisions by Defence to protect human health and the environment.

The purpose of this PFAS OMP factual report is to summarise the scope of works and findings for the September 2022 groundwater sampling event, conducted in accordance with the Sampling and Analysis Quality Plan (SAQP) (AECOM, 2022).

This report has been prepared in accordance with the *Defence PFAS OMP factual reports – interim guidance for preparation,* v2, May 2021 (Department of Defence, 2021a).

An annual interpretive report will be subsequently developed for the purpose of assessing the data collected during the discrete monitoring events completed over the preceding 12-month period (September 2022 through April 2023) and will include assessment of environmental variability and any statistically significant trends in PFAS concentrations.

2.0 Scope of work

The sampling event was completed in general accordance with the SAQP (AECOM, 2022). Prior to commencement of the sampling event, the SAQP (AECOM, 2022), was reviewed to ensure compliance with the following:

- PFAS National Environmental Management Plan (NEMP 2.0) (HEPA, 2020)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM, 1999)
- Defence OMP (Senversa, 2018)
- Defence Routine Environment Water Quality Monitoring Manual (Department of Defence, 2019)
- AS/NZS 5667:1998 Water quality – Sampling (AS/NZS, 1998)
- Water Quality Guidelines (ANZG, 2018)
- relevant Territory regulatory guidelines.

In summary, the scope of works for this sampling event, conducted in September 2022, included:

- Collection of 15 groundwater samples from 16 existing monitoring wells using Hydrasleeves™, excluding MW004, which was root impacted (refer to **Table 1** below, and **Figure 1** in **Appendix A**, for specific locations).
- Collection of two groundwater samples from two existing extraction bores by collecting grab samples from taps (refer to **Table 1** below, and **Figure 1** in **Appendix A**, for specific locations).
- Gauging of 16 groundwater monitoring wells for depth to groundwater (groundwater levels not collected from extraction bores).
- Collection of intra- and inter-laboratory duplicate samples at a rate of 1 in 10 primary samples, one rinsate and one field blank sample per sampling day for groundwater.
- Analysis of all samples for a suite of 28 PFAS analytes at the standard limit of reporting (LOR).
- Data management of the OMP field and laboratory data in the Defence ESdat database
- Preparation of this Sampling Event Factual Report.

2.1 Planned monitoring locations

The monitoring locations outlined within the SAQP (AECOM, 2022) for the OMP groundwater sampling event are tabled below:

Table 1 Groundwater sampling locations

Area	Description	Sampling Locations	Number of wells/ bores	Total
On-Base	North-eastern Boundary of Base	MW034	1	8
	Source Area 1	MW066	1	
	Source Area 2	MW004+, MW004D	2	
	Up gradient Source Area 1	MW012, MW012D	2	
	Up gradient Source Area 2	MW080	1	
	Cross-gradient of source areas 2 and 3	MW001	1	

Area	Description	Sampling Locations	Number of wells/ bores	Total
Off-Base	Thorngate Road – Northern Boundary	MW032	1	10
	Down gradient Source 1	MW023*	1	
	Across gradient Source 1	MW021, MW021D	2	
	Down gradient Source 2 and 3	MW018, MW031	2	
	Cross-gradient of Source Area 2 and 3	MW029, MW030	2	
	Shoal Bay Receiving Station (SBRS) – extraction bores	MW112^, MW113^	2	

+ Not sampled due to root impaction
* Contingency location MW024 sampled in lieu
^ Extraction bores and therefore not able to collect gauging data.

2.2 Deviations from the SAQP

The works completed during this sampling event included deviations from the SAQP (AECOM, 2022) as outlined below in Table 2 below.

Table 2 Deviations from the SAQP

SAQP	September 2022 sampling event	Impact to OMP
Sampling of monitoring location MW004	Location not sampled due to root impaction preventing deployment of HydraSleeve™	Loss of data.

3.0 Sampling methodology

The methodology adopted for the biannual groundwater sampling event in September 2022 was in accordance with the SAQP (AECOM, 2022) and is summarised below:

Table 3 Sampling methodology

Item	Details
Groundwater sampling methodology	
Groundwater gauging	Where accessible, the depth to groundwater was measured in each monitoring well within a 24-hour period, and then again immediately prior to collection of groundwater samples using an interface probe. Refer to **Section 4.0** and **Appendix B – Table B1** for gauging and field parameters results. Refer to Appendix X for field forms utilised during field data collection.
Field parameters	Groundwater field parameters were recorded ex-situ, using a YSI Pro Water Quality Meter. Parameters recorded consisted of the following: temperature (°C), electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP) and pH. Observations of odour, colour and clarity (turbidity) of groundwater was recorded at each location. Refer to Appendix X for field forms utilised during field data collection. Refer to **Appendix C** for calibration records of the YSI.
Water sampling methodology	Groundwater samples were collected from all accessible wells using no-purge methodology HydraSleeves™, which were installed within the screened interval of the wells for a minimum of 24 hours prior to sampling. HydraSleeve™ placement was based on a review of the well construction logs. Once sampling was completed, new HydraSleeves™ were redeployed within the screened interval in preparation for the next sampling round. The SBRS extraction bores were sampled directly from taps fixed to the bore headworks.
QA/QC samples	Field QA/QC samples collected included intra- and inter-laboratory duplicates at a rate of one in 10 primary samples, rinsate and field blank samples at a rate of one per day of sampling and trip blank samples at a rate of one per esky. A validation assessment of the data has been completed and is presented in **Appendix D.**
Sample analysis	Samples were submitted to the primary and secondary laboratories for analysis. ALS Environmental (ALS) Sydney, NSW was used as the primary laboratory. The National Measurement Institute (NMI) of Sydney, NSW was used as the secondary laboratory. ALS and NMI methods for analyses were certified by the National Association of Testing Authorities (NATA). Laboratory certificates are presented in **Appendix E.**

3.1 Adopted Screening Criteria

Screening criteria were selected on the basis of national guidance in the form of the PFAS National Environmental Management Plan, Defence estate and environmental strategies, and Defence PFAS-specific strategies and guidance. Guidance documents used to assess the dataset includes the following:

- Department of Health (DoH) Health Based Guidance Values for PFAS for use in site investigations in Australia (Department of Health, 2019)
- Heads of the Environment Protection Authority (HEPA), PFAS National Environmental Management Plan (NEMP 2.0) (HEPA, 2020)

- National Health and Medical Research Council (NHMRC), Guidance on PFAS in Recreational Water (NHMRC, 2019)
- National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B1, as amended in 2013 (ASC NEPM, 2013).

The adopted screening criteria which have been adopted for groundwater are presented **Table 4**.

Table 4 Summary of adopted screening criteria for groundwater.

Pathway	Compound	Criteria	Comment/Reference
Human health receptors			
Drinking water - groundwater	PFOS + PFHxS	0.07 µg/L	These values are from the PFAS NEMP 2.0 (HEPA, 2020). *All groundwater results will be compared to these criteria.*
	PFOA	0.56 µg/L	
Ecological receptors			
Freshwater (99% species protection values)	PFOS	0.00023 µg/L	These values are from the PFAS NEMP 2.0 (HEPA, 2020). The 99% level of protection has been applied for slightly to moderately disturbed ecosystems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. For the purposes of preliminary screening of analytical water results, the laboratory LOR will be adopted rather than sole use of the criteria value. *All groundwater results will be compared to these criteria.*
	PFOA	19 µg/L	

3.2 Data quality objectives and data validation

The data quality objectives (DQOs) and data quality indicators (DQIs) adopted for these works are presented in the SAQP (AECOM, 2022).

Data validation assessment is provided in **Appendix D**.

Key findings from the data validation were as follows:

- The potential exists for concentrations of PFOS to be below the LOR, but above the 99% ecosystem protection guideline in samples MW004D, MW012, MW012, MW012D, MW018, MW021, MW021D, MW024, MW029, MW031, MW112 and MW113. This should be taken into consideration when interpreting results.

Data validation procedures employed in the assessment of the field and laboratory QA/QC data are indicative that the overall quality of the analytical data produced is acceptably reliable for the purpose of this report. An examination of sampling analysis data compared to the data validation findings did not result in any results that required flagging for potential inaccuracies.

All data collected during this event has been reviewed and uploaded to the Defence ESdat database in accordance with Defence Contamination Management Manual (DCMM) Annex L, August 2021 (Department of Defence, 2021b) requirements.

4.0 Field observations and results

4.1 General field observations

The following field observations were applicable across the entirety of the September 2022 sampling event.

Table 5 General field observations

Item	Observation
Weather conditions	Weather in general was observed to be hot, 26.0 – 33.0 °C, with high humidity in the morning (>70 %) becoming lower in the afternoon (<60 %). No rainfall was recorded in Darwin during the sampling event, and less than 1 mm was recorded between 1 July and 21 September. Low precipitation totals prior to sampling provides optimal conditions to collect late-dry season data.
Estate Management Works or Training Activities	During the sampling event, no notable estate works, or training activities were observed in the vicinity of sampling locations. Base activities are not expected to have a material impact on sampling results.

4.2 Groundwater

4.2.1 Field observations and field measurements

Field data was collected electronically on tablets and uploaded into ESdat for development of report tables. Field results are presented in **Appendix B – Table B1.**

Table 6 Groundwater observations and field measurements

Item	Observations and field measurements
Fieldwork Dates	The sampling event was completed between 19 and 21 September 2022.
Access and Sample Collection	All monitoring wells and bores were accessible and sampled with the exception of MW004 and MW023. MW004 was blocked by tree roots. The gauging probe was narrow enough to measure total depth however, a HydraSleeve™ was not able to be deployed beyond the blockage. MW023 was dry and its contingency location MW024 was sampled instead. Monitoring locations MW112 and MW113 are extraction bores and samples were collected from the fitted taps. No standing water levels (SWL) were recorded for these locations.
Monitoring Well Network Condition	The monitoring well network was generally in good condition with the exception of MW004, which is blocked with tree roots that were evident on the interface probe and stopping the HydraSleeve™ from being deployed.
Field Observations	Root impaction was noted at monitoring well MW004. High turbidity was observed in samples collected from monitoring locations MW029, MW030 and MW031. HydraSleeves™ collected from monitoring locations MW001 and MW024 contained red sediment and sediment build-up was observed at the bottoms of wells during depth to bottom measurements. Aside from the data gap caused by not collecting from MW004, observed field conditions are not expected to have a material impact on the sampling results.

Item	Observations and field measurements
Depth to Groundwater and flow direction	Depth to groundwater was recorded from 16 of 19 wells visited (monitoring well MW023 was dry and MW024 was measured in lieu, and monitoring locations MW112 and MW113 are production bores and not able to be gauged). Recorded depth to groundwater ranged from 2.285 (MW030) to 8.420 (MW012) metres below top of casing (mbTOC). Groundwater elevations were between 3.88 (MW024) and 23.06 (MW012D) metres Australian Height Datum (mAHD). Groundwater gauging data is presented in Appendix B **– Table B1**. Inferred groundwater contours and groundwater flow directions at the site in September 2022 are shown in **Appendix A - Figure 2**. Inferred groundwater contouring suggests that groundwater in the shallow aquifer unit drains east and northeast towards Millner's Creek.
Field Parameters	Groundwater geochemical parameters were measured during sample collection from the HydraSleeve™ (or from the grab samples obtained from the taps) using a decontaminated YSI cup and YSI Pro Water Quality Meter. The readings are presented in **Appendix B - Table B1** and are summarised below: • DO ranged from 1.28 mg/L (MW029) to 3.16 mg/L (MW021). • EC ranged from 32.3 µS/cm (MW012) to 14,827 µS/cm (MW024); all wells other than MW024 reported EC values below 400 µS/cm indicating a generally low salinity; well MW024 is located within the Close Training Area, downgradient of Robertson Barracks, and the higher salinity in this well is reflective of its location. • pH ranged from 4.4 (MW080) to 7.3 (MW112) indicating acidic to neutral conditions. • Redox ranged from -52.8 mV (MW113) to 247.6 mV (MW012) indicating oxidising to reducing conditions.

4.2.2 PFAS groundwater analytical results

During this sampling event, seven of the 17 groundwater locations sampled reported concentrations of PFAS above the laboratory limits of reporting (LOR).

There were no first-time detects or new exceedances at any groundwater monitoring locations.

The PFAS groundwater analytical results from the September 2022 sampling event are summarised below (**Table 7**) and presented in **Appendix B – Table B2**.

Table 7 First-time detections of PFAS and exceedances of guidelines in groundwater

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		September 2022	Historical maximum	September 2022	Historical maximum	September 2022	Historical maximum
First-time detections of Sum of PFHxS + PFOS, PFOS or PFOA in groundwater.	There were no first-time detections of PFHxS + PFOS, PFOS or PFOA during this sampling event.						
New exceedance of human health criteria for sum of PFHxS + PFOS or	There were no new exceedances of human health criteria in groundwater during this sampling event.						

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		September 2022	Historical maximum	September 2022	Historical maximum	September 2022	Historical maximum
PFOA in groundwater (shaded yellow).							
New exceedance of ecological criteria for PFOS or PFOA in groundwater	There were no new exceedances of ecological criteria in groundwater during this sampling event.						

5.0 Summary and Next Sampling Events

5.1 Summary of Monitoring Event

The end of dry season groundwater monitoring event was completed at the Base and publicly accessible land within the Management Area between 19 and 21 September 2022. All proposed groundwater monitoring wells were sampled other than MW004 (blocked) and MW023 (dry); contingency well MW024 was sampled in lieu of MW023.

The findings of the September 2022 sampling event and the recommended actions are summarised in **Table 8** below.

Table 8 Summary of Sampling Event

Item	Comment	Recommended Actions
Access to sampling locations	Monitoring well MW023 was dry during this event. Monitoring well MW004 is blocked preventing sampling.	Contingency monitoring well MW024 utilised in lieu of MW023. Monitoring well MW004 should be examined for potential root removal and/or repairs.
Analytical Results	PFAS concentrations were recorded above the LOR at seven of 17 monitoring well locations sampled.	No actions recommended. Ongoing monitoring in accordance with the OMP.
New exceedance of NEMP 2.0 drinking water and ecological guideline values in groundwater	No new exceedance of the NEMP 2.0 drinking water or ecological guideline values for PFHxS+PFOS, PFOS and PFOA during the September 2022 sampling event.	Ongoing monitoring in accordance with the OMP.
First-time detection of PFAS in groundwater	There were no first-time detections of PFHxS+PFOS, PFOS and PFOA in groundwater during the September 2022 sampling event.	Ongoing monitoring in accordance with the OMP.
New exceedance of NEMP 2.0 drinking	There were no new exceedances of PFHxS+PFOS, PFOS and PFOA in	Ongoing monitoring in accordance with the OMP.

Item	Comment	Recommended Actions
water and ecological guideline values at extraction bores at SBRS Facility	groundwater collected from extraction bores from the SBRS facility during the September 2022 sampling event.	

5.2 Upcoming Sampling Events

Wet season surface water sampling will take place during the early part of the wet season, likely November/December 2022, and then again during the late part of the wet season in March/ April 2023.

The next groundwater sampling event is scheduled for April 2023.

5.3 Upcoming Annual Interpretive Report

The fourth annual interpretive report is scheduled to be delivered in the second half of 2023, covering the period from September 2022 to April 2023.

6.0 References

AECOM, 2022. *Sampling Analysis and Quality Plan - Robertson Barracks Revision 2,* Darwin: AECOM.

ANZG, 2018. *Water Quality Guidelines,* s.l.: s.n.

AS/NZS, 1998. *Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples,* s.l.: s.n.

ASC NEPM, 2013. *Schedule B1. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), Schedule B1 Investigation Levels for Soil and Groundwater,* s.l.: s.n.

Department of Defence, 2018. *PFAS Management Area Plan,* s.l.: s.n.

Department of Defence, 2019. *Pollution Prevention Guideline: Routine Water Quality Monitoring Manual,* s.l.: s.n.

Department of Defence, 2021a. *PFAS OMP Factual Report Guidance, Version 0.2, May 2021,* s.l.: s.n.

Department of Defence, 2021b. *Contamination Management Manual, Annex L, August 2021,* s.l.: s.n.

Department of Health, 2019. *Health based guidance values for PFAS for use in site investigations in Australia 2017 (as amended 2019),* s.l.: s.n.

HEPA, 2020. *PFAS National Environmental Management Plan,* s.l.: s.n.

NEPM, A., 1999. *National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B1,* s.l.: s.n.

NHMRC, 2019. *Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water,* s.l.: National Health and Medical Research Council.

Senversa, 2018. *PFAS Ongoing Monitoring Plan, October 2018.* s.l.:s.n.

Appendix A

Figures



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 100 200 400 600 800

metres

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LEGEND

- Groundwater Monitoring Locations
- Dry/Damaged/Blocked Locations
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Note:
MW024 sampled as contingency location for MW023

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence
ROBERTSON BARRACKS
PFAS ONGOING MONITORING PROGRAM
END OF DRY SEASON REPORT 2022

Groundwater Sampling Locations

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	
VERSION:	1

Figure
1

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A3 size



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DATUM GDA 1994, PROJECTION MGA ZONE 52

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LEGEND

- Dry/Damaged/Blocked Locations
- Groundwater Monitoring Locations
- 75.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level
- Inferred Flow Direction
- Monitoring Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Road
- Track

Note:
- MW004D, MW012D, MW021D, MW034 not included in contouring.
- Millner Creek to the south of the Base influences nearby groundwater flow direction, however overall groundwater flow direction is to the north-east.

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence
ROBERTSON BARRACKS
PFAS ONGOING MONITORING PROGRAM
END OF DRY SEASON REPORT 2022

Groundwater Contours

PROJECT ID 60612561
CREATED BY [redacted]
LAST MODIFIED
VERSION:

Figure 2

A3 size

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Appendix B

Tables

Table B1
Groundwater Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

Groundwater Field Results

AECOM

	Gauging Results						Geochemistry Parameters											
Location ID	**Date**	**TOC (mAHD)**	**Depth to Water (mbTOC)**	**Well Depth (mbTOC)**	**Water Elevation (mAHD)**	**Condition of Gatic**	**Date**	**DO (mg/L)**	**EC (µS/cm)**	**TDS (calc) (mg/L)**	**pH**	**Redox (mV)**	**Temp (°C)**	**Turbidity**	**Water Colour**	**Odour**	**Sheen**	**Sample Method**
MW001	19/09/2022	24.37	2.680	8.15	21.69	Good	20/09/2022	1.51	47	28.20	4.89	136	29	Moderate	Red	Odourless	No sheen	Hydrasleeve
MW004	19/09/2022	26.78	4.965	8.28	21.82	Good	-	NM	NM	NM	NM	NM	NM	-	-	-	-	-
MW004D	19/09/2022	26.78	4.955	31.30	21.83	Good	20/09/2022	1.69	341.4	204.84	6.71	-42.3	30.7	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012	19/09/2022	30.65	8.420	NM	22.23	Good	20/09/2022	1.56	32.3	19.38	4.74	247.6	31.9	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012D	19/09/2022	30.77	7.715	30.75	23.06	Good	20/09/2022	1.69	38.8	23.28	5.1	140.0	31.1	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW018	19/09/2022	25.57	4.525	8.71	21.05	Good	20/09/2022	2.32	39.9	23.94	5.0	141.1	30.0	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW021	19/09/2022	18.03	2.822	8.72	15.21	Good	20/09/2022	3.16	68	40.80	4.89	129.6	29.2	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW021D	19/09/2022	17.99	3.242	30.90	14.75	Good	20/09/2022	2.19	150.1	90.06	5.54	188.8	29.5	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW023	20/09/2022	12.10	Dry	6.75	NM	Good	-	-	-	-	-	-	-	-	-	-	-	-
MW024	20/09/2022	6.34	2.458	8.95	3.88	Good	21/09/2022	2.21	14827	8896.20	6.69	191.3	30.8	Low	Red	Odourless	No sheen	Hydrasleeve
MW029	19/09/2022	25.44	3.270	7.76	22.17	Good	20/09/2022	1.28	33.7	20.22	5.53	94.8	31.6	High	Light brown	Odourless	No sheen	Hydrasleeve
MW030	19/09/2022	23.33	2.285	7.14	21.05	Good	20/09/2022	2.19	37.8	22.68	5.12	146	29	High	Light brown	Odourless	No sheen	Hydrasleeve
MW031	19/09/2022	25.56	4.015	8.06	21.54	Good	20/09/2022	2.25	56.9	34.14	5.25	137.4	31.2	High	Light brown	Odourless	No sheen	Hydrasleeve
MW032	19/09/2022	19.86	5.068	8.68	14.79	Good	20/09/2022	3.02	104.8	62.88	5.43	108.4	30.2	Moderate	Light brown	Odourless	No sheen	Hydrasleeve
MW034	19/09/2022	19.50	5.932	11.49	13.57	Good	20/09/2022	1.34	33.6	20.16	4.74	203.3	31.7	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW066	19/09/2022	23.19	5.635	11.94	17.56	Good	20/09/2022	1.54	64.7	38.82	4.5	217.9	32.7	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW080	19/09/2022	26.56	4.648	13.00	21.91	Good	20/09/2022	1.82	65.5	39.30	4.38	245.2	30.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW112	-	NM	NM	NM	NM	Tapped Bore	21/09/2022	3.02	799	479.40	7.32	-37.5	32.9	Low	Light brown	Odourless	No sheen	Tap
MW113	-	NM	NM	NM	NM	Tapped Bore	21/09/2022	2.71	384.7	230.82	6.77	-52.8	33	Low	Light brown	Odourless	No sheen	Tap

Notes:
MW024 - contingency well for dry MW023
mbTOC: metres below top of casing
mAHD: metres Australia Height Datum
NM: not measured
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table B2
Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

Groundwater Analytical Results

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					PFAS Full Suite																												
					10:2 FTS	4:2 FTS	6:2 FTS	8:2 FTS	EtFOSA	EtFOSAA	EtFOSE	MeFOSA	MFOSAA	MeFOSE	PFBS	PFBA	PFDS	PFDA	PFDoDA	PFHpS	PFHpA	PFHxA	PFNA	FOSA	PFPeS	PFPeA	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFHxS and PFOS	PFOS	PFOA	PFHxS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.05	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.02	0.05	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	0.02	0.02	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Freshwater 99% Species Protection																															**0.00023**	**19**	
PFAS NEMP 2020 Drinking Water																																**0.56**	
Location	**Field ID**	**Date**	**Lab Report**																														
MW001	1200_MW001_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.17	**0.17**	**0.11**	<0.01	0.06
MW004D	1200_MW004D_220820	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012	1200_MW012_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012D	1200_MW012D_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW018	1200_MW018_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021	1200_MW021_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021D	1200_MW021D_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW024	1200_MW024_220921	21/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW029	1200_MW029_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	**0.02**	<0.01	<0.01*	<0.01	<0.01
MW030	1200_MW030_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	0.16	**0.16**	**0.11**	<0.01	0.05
MW031	1200_MW031_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW032	1200_MW032_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	0.03	<0.05	<0.02	<0.02	0.14	**0.08**	**0.05**	<0.01	0.03
MW034	1200_MW034_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.04	<0.05	<0.02	<0.02	0.19	**0.11**	**0.08**	<0.01	0.03
MW066	1200_MW066_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.58	**0.53**	**0.39**	0.02	0.14
MW080	1200_MW080_220920	20/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.05	<0.02	<0.02	0.1	**0.07**	**0.07**	<0.01	<0.01
MW112	1200_MW112_220921	21/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW113	1200_MW113_220921	21/09/2022	ES2234122	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01

Notes:
µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedance of human health screening criteria

Appendix C

Calibration Certificate

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Level 3, 9 Cavenagh Street
Darwin, Nt 0800

Water Quality Probe Calibration Sheet

Date	YSI #	Temp (°C)	pH 4		pH 7		DO (100%)		Electrical conductivity 1413 (µS/cm)		ORP		Initials
			Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	
20/4	[redacted]	28.1	3.99	4.00	6.92	7.01			13081	12958	214.8	228.9	[redacted]
21/4		28.4	3.97	3.99	7.10	7.00			12709	12905	224.5	228.9	

Appendix D

Data Validation Report

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DATA VALIDATION REPORT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	[redacted]	**Date:**	10/11/2022
Site:	1200 - Robertson Barracks		
Matrix:	Water	**Data Verified by:**	[redacted]
Laboratory:	ALS and NMI Sydney	**Date:**	15/11/2022
Lab reference:	ES2234122, RN1368685		

Key Findings:
The analytical data can be used as a basis for interpretation subject to the limitations outlined below:

- The potential exists for concentrations of PFOS to be below the LOR, but above the 99% ecosystem protection guideline in samples MW004D, MW012, MW012, MW012D, MW018, MW021, MW021D, MW024, MW029, MW031, MW112 and MW113 and should be taken into consideration when interpreting results.

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			
Number of tests requested/reported		✓			
Sample handling/preservation/holding times			✓	1	No
Frequency of laboratory QA/QC			✓	2	No
Limits of reporting (LOR)			✓	3	No
Blank analysis	Field blank	✓			
	Rinsate blank		✓	4	No
	Trip blank	✓			
	Method blank	✓			
Field intra-laboratory relative percent differences (RPDs)		✓			
Field inter-laboratory RPDs		✓			
Laboratory duplicate RPDs		✓			
Matrix spike (MS) % recoveries			✓	5	No
Laboratory control spike (LCS) % recoveries		✓			
Surrogate % recoveries		✓			
Other observations		✓			N/A

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Comments	
1. Sample handling/preservation/ holding times	Primary samples were received at the below temperatures: **Event** / **Batch Number** / **Temperature** September 2022 / ES2234122 / 14.6°C RN1368685 / Chilled The sample receipt temperatures were not recorded for the NMI inter-laboratory duplicate samples; however the samples were noted to be chilled. Potential degradation of analytes and under reporting must be taken into consideration. However, as the receipt temperature was well below the ambient groundwater temperature at the time of sampling (~30ºC) and the samples were immediately cooled upon collection, this is not considered to significantly impact the interpretation of results.
2. Frequency of laboratory QA/QC	Laboratory duplicate samples were not reported at the required frequencies for PFAS analytes in the primary batch ES2234122. The precision of the data can be assessed as acceptable based on intra- and inter-laboratory duplicate RPDs which were reported at the required frequencies and within control limits. Matrix spikes were not reported at the required frequencies for PFAS analytes in batch ES2234122. The accuracy of the data can be assessed as acceptable based on method blanks, LCS and surrogate spike recoveries (which were reported at the required frequencies and within control limits).
3. Limits of reporting (LOR)	Limits of reporting were sufficiently low to enable assessment against adopted guideline criteria, with the exception of PFOS in lab batch ES2234122. The potential exists for concentrations of PFOS to be below the LOR, but above the 99% ecosystem protection guideline in samples MW004D, MW012, MW012, MW012D, MW018, MW021, MW021D, MW024, MW029, MW031, MW112 and MW113 and should be taken into consideration when interpreting results.
4. Rinsate blank	Rinsate blanks were collected at a frequency of one per sampling day (one in total) with the exception of sampling on the 21 September 2022. As the available rinsate blank, field blanks and trip blanks reported concentrations of all volatile analytes below the LOR, cross contamination via volatilisation during transport to the laboratory is assessed to not have occurred. However, the decontamination methods are assessed as acceptable and the potential for cross contamination via sampling methods is considered unlikely based on the following: • All sampling equipment was either dedicated, disposable or decontaminated with a solution of water and Liquinox between sampling locations • The decontamination methods and field staff were consistent over the course of the sampling event • Concentrations of all analytes were reported below the LOR in the rinsate sample analysed • Laboratory results are consistent with field observations and historical ranges and no evidence of cross contamination is apparent
5. Matrix spike (MS) % recoveries	Matrix spike recoveries (where reported) were within control limits for the primary laboratory batch ES2234122, with the exception of several PFAS analytes, which reported less than the lower control limit due to sample matrix and matrix interferences as shown in the Certificate or Analysis and the Quality Control Interpretive report.

Data Validation Report
QAQC Blanks
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

QAQC Blanks

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Lab Report		ES2234122	ES2234122	ES2234122	ES2234122	ES2234122
Field ID		1200_QC300_220920	1200_QC400_220920	1200_QC401_220921	1200_QC500_220920	1200_QC501_220921
Date		20/09/2022	20/09/2022	21/09/2022	20/09/2022	21/09/2022
Sample Type		Rinsate	Field Blank	Field Blank	Trip Blank	Trip Blank
Analyte	**Units**	**LOR**					
PFAS Full Suite							
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Data Validation Report
RPDs
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

Relative Percentage Differences

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Lab Report Number	ES2234122	ES2234122		ES2234122	ES2234122		ES2234122
Field ID	1200_MW004D_220920	1200_QC100_220920	**RPD**	1200_MW012_220920	1200_QC101_220920	**RPD**	1200_MW004D_220920
Sample Type	Primary	Intra-lab Duplicate		Primary	Inter-lab Duplicate		Primary
Date	20/09/2022	20/09/2022		20/09/2022	20/09/2022		20/09/2022

Analyte	Units	LOR							
PFAS Full Suite									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.1	0	<0.1
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.02	0	<0.02
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01

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

Data Validation Report
RPDs
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

Relative Percentage Differences

AECOM

Lab Report Number	RN1368685			ES2234122	RN1368685	
Field ID	1200_QC200_220920	**RPD**		1200_MW012_220920	1200_QC201_220920	**RPD**
Sample Type	Intra-lab Duplicate			Primary	Inter-lab Duplicate	
Date	20/09/2022			20/09/2022	20/09/2022	

Analyte	Units	LOR					
PFAS Full Suite							
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.01	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.01	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.01	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.01	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.02	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.02	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.05	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.02 (Interlab)	<0.02	0	<0.05	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.01	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	<0.01	0	<0.01	<0.01	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	0	<0.01	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01 : 0.02 (Interlab)	<0.02	0	<0.01	<0.02	0
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	0	<0.01	<0.01	0

**High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 200 (1-10 x LOR); 50
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories.

Appendix E

Laboratory Certificates

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2234122**	Page	: 1 of 8
Amendment	: **2**		
Client	: [redacted]	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]5 DARWIN NT, AUSTRALIA 0801	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 26-Sep-2022
Order number	: [redacted]	Date Analysis Commenced	: 27-Sep-2022
C-O-C number	: —	Issue Date	: 13-Oct-2022
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/139/19 V3		
No. of samples received	: 25		
No. of samples analysed	: 24		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, 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*
[redacted]	Organic Chemist	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4610070)									
EM2218370-006	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.05	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4610070)									
EM2218370-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.2	<0.2	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4610070)									
EM2218370-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	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: 4610070) - continued									
EM2218370-006	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.12	<0.12	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4610070)									
EM2218370-006	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	0.16	0.14	13.3	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.57	0.60	5.1	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	0.68	0.74	7.8	0% - 50%
EP231P: PFAS Sums (QC Lot: 4610070)									
EM2218370-006	Anonymous	EP231X: Sum of PFAS	---	0.01	µg/L	1.47	1.54	4.7	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4608598)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	82.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	92.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	95.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	84.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	85.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	89.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4610070)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	94.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	107	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4630435)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	98.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	89.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4608598)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	85.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	88.4	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	110	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.6	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	96.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	93.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4610070)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.0	73.0	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: 4610070) - continued								
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	104	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	115	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	98.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	111	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4630435)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	92.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	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	98.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	98.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	92.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.0	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	88.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4608598)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	89.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	91.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	84.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	96.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	99.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	95.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	94.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4610070)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	92.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	89.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	89.0	62.6	147

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: 4610070) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	100	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	97.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	106	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4630435)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	91.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	115	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.2	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	94.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	92.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4608598)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.8	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	94.4	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	92.0	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	91.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4610070)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.0	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	106	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	97.0	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	82.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4630435)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.0	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	115	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	103	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	94.4	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**

				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: 4610070)							
EM2218370-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# 54.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	# 54.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# 52.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	# 44.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# 56.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	# 34.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4610070)							
EM2218370-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	79.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# 54.0	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# 52.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	# 52.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	# 46.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	# 46.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	# 44.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	# 48.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	# 40.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	# 48.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	# 47.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4610070)							
EM2218370-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	# 0.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	# 0.0	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	# 0.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	# 0.8	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	# 2.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	# 10.0	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	# 6.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4610070)							
EM2218370-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	# 32.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	# 42.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	# 56.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	# 62.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2234122**	Page	: 1 of 8
Amendment	: **2**		
Client	: [redacted]	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 26-Sep-2022
Site	: ---	Issue Date	: 13-Oct-2022
Sampler	: [redacted]	No. of samples received	: 25
Order number	: [redacted]	No. of samples analysed	: 24

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EM2218370--006	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	54.0 %	72.0-130%	**Recovery less than lower data quality objective**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2218370--006	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	54.0 %	71.0-127%	**Recovery less than lower data quality objective**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2218370--006	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	52.0 %	68.0-131%	**Recovery less than lower data quality objective**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2218370--006	Anonymous	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	44.0 %	69.0-134%	**Recovery less than lower data quality objective**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2218370--006	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	56.0 %	65.0-140%	**Recovery less than lower data quality objective**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2218370--006	Anonymous	**Perfluorodecane sulfonic acid (PFDS)**	335-77-3	34.0 %	53.0-142%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	54.0 %	72.0-129%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	52.0 %	72.0-129%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluoroheptanoic acid (PFHpA)**	375-85-9	52.0 %	72.0-130%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorooctanoic acid (PFOA)**	335-67-1	46.0 %	71.0-133%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorononanoic acid (PFNA)**	375-95-1	46.0 %	69.0-130%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorodecanoic acid (PFDA)**	335-76-2	44.0 %	71.0-129%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluoroundecanoic acid (PFUnDA)**	2058-94-8	48.0 %	69.0-133%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorododecanoic acid (PFDoDA)**	307-55-1	40.0 %	72.0-134%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorotridecanoic acid (PFTrDA)**	72629-94-8	48.0 %	65.0-144%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2218370--006	Anonymous	**Perfluorotetradecanoic acid (PFTeDA)**	376-06-7	47.2 %	71.0-132%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**Perfluorooctane sulfonamide (FOSA)**	754-91-6	0.0 %	67.0-137%	**Recovery less than lower data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries - Continued							
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**N-Methyl perfluorooctane sulfonamide (MeFOSA)**	31506-32-8	0.0 %	68.0-141%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**N-Ethyl perfluorooctane sulfonamide (EtFOSA)**	4151-50-2	0.8 %	62.6-147%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)**	24448-09-7	0.8 %	66.0-145%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)**	1691-99-2	2.4 %	57.6-145%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)**	2355-31-9	10.0 %	65.0-136%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2218370--006	Anonymous	**N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)**	2991-50-6	6.0 %	61.0-135%	**Recovery less than lower data quality objective**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2218370--006	Anonymous	**4:2 Fluorotelomer sulfonic acid (4:2 FTS)**	757124-72-4	32.0 %	63.0-143%	**Recovery less than lower data quality objective**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2218370--006	Anonymous	**6:2 Fluorotelomer sulfonic acid (6:2 FTS)**	27619-97-2	42.0 %	64.0-140%	**Recovery less than lower data quality objective**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2218370--006	Anonymous	**8:2 Fluorotelomer sulfonic acid (8:2 FTS)**	39108-34-4	56.0 %	67.0-138%	**Recovery less than lower data quality objective**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2218370--006	Anonymous	**10:2 Fluorotelomer sulfonic acid (10:2 FTS)**	120226-60-0	62.0 %	71.4-144%	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	59	1.69	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	59	1.69	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
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW030_220920 - extra	**20-Sep-2022**	**12-Oct-2022**	19-Mar-2023	✓	**12-Oct-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW032_220920, 1200_MW021_220920, 1200_MW021D_220920, 1200_MW018_220920, 1200_MW080_220920, 1200_MW004D_220920, 1200_MW001_220920, 1200_MW012D_220920, 1200_MW012_220920, 1200_MW034_220920, 1200_MW066_220920, 1200_MW031_220920, 1200_MW029_220920, 1200_QC100_220920, 1200_QC101_220920, 1200_QC300_220920, 1200_QC400_220920, 1200_QC500_220920	**20-Sep-2022**	**30-Sep-2022**	19-Mar-2023	✓	**30-Sep-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW024_220921, 1200_MW112_220921, 1200_MW113_220921	**21-Sep-2022**	**01-Oct-2022**	20-Mar-2023	✓	**04-Oct-2022**	20-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_220921, 1200_QC501_220921	**21-Sep-2022**	**30-Sep-2022**	20-Mar-2023	✓	**30-Sep-2022**	20-Mar-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)							
1200_MW030_220920 - extra	**20-Sep-2022**	**12-Oct-2022**	19-Mar-2023	✓	**12-Oct-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW032_220920, 1200_MW021_220920, 1200_MW021D_220920, 1200_MW018_220920, 1200_MW080_220920, 1200_MW004D_220920, 1200_MW001_220920, 1200_MW012D_220920, 1200_MW012_220920, 1200_MW034_220920, 1200_MW066_220920, 1200_MW031_220920, 1200_MW029_220920, 1200_QC100_220920, 1200_QC101_220920, 1200_QC300_220920, 1200_QC400_220920, 1200_QC500_220920	**20-Sep-2022**	**30-Sep-2022**	19-Mar-2023	✓	**30-Sep-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW024_220921, 1200_MW112_220921, 1200_MW113_220921	**21-Sep-2022**	**01-Oct-2022**	20-Mar-2023	✓	**04-Oct-2022**	20-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_220921, 1200_QC501_220921	**21-Sep-2022**	**30-Sep-2022**	20-Mar-2023	✓	**30-Sep-2022**	20-Mar-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
1200_MW030_220920 - extra	**20-Sep-2022**	**12-Oct-2022**	19-Mar-2023	✓	**12-Oct-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW032_220920, 1200_MW021_220920, 1200_MW021D_220920, 1200_MW018_220920, 1200_MW080_220920, 1200_MW004D_220920, 1200_MW001_220920, 1200_MW012D_220920, 1200_MW012_220920, 1200_MW034_220920, 1200_MW066_220920, 1200_MW031_220920, 1200_MW029_220920, 1200_QC100_220920, 1200_QC101_220920, 1200_QC300_220920, 1200_QC400_220920, 1200_QC500_220920	**20-Sep-2022**	**30-Sep-2022**	19-Mar-2023	✓	**30-Sep-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW024_220921, 1200_MW112_220921, 1200_MW113_220921	**21-Sep-2022**	**01-Oct-2022**	20-Mar-2023	✓	**04-Oct-2022**	20-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_220921, 1200_QC501_220921	**21-Sep-2022**	**30-Sep-2022**	20-Mar-2023	✓	**30-Sep-2022**	20-Mar-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)							
1200_MW030_220920 - extra	**20-Sep-2022**	**12-Oct-2022**	19-Mar-2023	✓	**12-Oct-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW032_220920, 1200_MW021_220920, 1200_MW021D_220920, 1200_MW018_220920, 1200_MW080_220920, 1200_MW004D_220920, 1200_MW001_220920, 1200_MW012D_220920, 1200_MW012_220920, 1200_MW034_220920, 1200_MW066_220920, 1200_MW031_220920, 1200_MW029_220920, 1200_QC100_220920, 1200_QC101_220920, 1200_QC300_220920, 1200_QC400_220920, 1200_QC500_220920	**20-Sep-2022**	**30-Sep-2022**	19-Mar-2023	✓	**30-Sep-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW024_220921, 1200_MW112_220921, 1200_MW113_220921	**21-Sep-2022**	**01-Oct-2022**	20-Mar-2023	✓	**04-Oct-2022**	20-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_220921, 1200_QC501_220921	**21-Sep-2022**	**30-Sep-2022**	20-Mar-2023	✓	**30-Sep-2022**	20-Mar-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_MW030_220920 - extra	**20-Sep-2022**	**12-Oct-2022**	19-Mar-2023	✓	**12-Oct-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW032_220920, 1200_MW021_220920, 1200_MW021D_220920, 1200_MW018_220920, 1200_MW080_220920, 1200_MW004D_220920, 1200_MW001_220920, 1200_MW012D_220920, 1200_MW012_220920, 1200_MW034_220920, 1200_MW066_220920, 1200_MW031_220920, 1200_MW029_220920, 1200_QC100_220920, 1200_QC101_220920, 1200_QC300_220920, 1200_QC400_220920, 1200_QC500_220920	**20-Sep-2022**	**30-Sep-2022**	19-Mar-2023	✓	**30-Sep-2022**	19-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW024_220921, 1200_MW112_220921, 1200_MW113_220921	**21-Sep-2022**	**01-Oct-2022**	20-Mar-2023	✓	**04-Oct-2022**	20-Mar-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC401_220921, 1200_QC501_220921	**21-Sep-2022**	**30-Sep-2022**	20-Mar-2023	✓	**30-Sep-2022**	20-Mar-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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	59	**1.69**	**10.00**	✘	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	59	**5.08**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	59	**5.08**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	59	**1.69**	**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
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.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ALS BRISBANE 24 Stanton Road Molendinar QLD 4214 Ph: 07 3243 7222 E: EnviroSales@alsglobal.com

ALS NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4968 9433 E: newcastle@alsglobal.com

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

ALS TOWNSVILLE 14-15 Desma Court Garbutt QLD 4814 Ph: 07 4796 0600 E: townsville@alsglobal.com

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

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

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

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

ALS TOWNSVILLE 14-15 Desma Court Garbutt QLD 4814 Ph: 07 4796 0600 E: townsville@alsglobal.com

CLIENT: AECOM	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	● Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE:		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: NT_0990_PFASOMP	**ALS QUOTE NO.:** SY/139/19 V3	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: [redacted]		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: [redacted]	**CONTACT PH:** [redacted]	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: [redacted]	**SAMPLER MOBILE:** [redacted]	**RELINQUISHED BY:** [redacted]	**RECEIVED BY:** [redacted]
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**	DATE/TIME: 15:20 21/9/22	DATE/TIME: 21/09 at 3:25 pm
Email Reports to (will default to PM if no other addresses are listed): [redacted]		**RELINQUISHED BY:**	**RECEIVED BY:** [redacted]
Email Invoice to (will default to PM if no other addresses are listed): [redacted]		DATE/TIME:	DATE/TIME: 27/09/2022 07:30 Am

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Forward QC200s to NMI Sydney

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
LAB ID	Sample ID: 0990_MWXXX_220XXX	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	1200_MW032_220920	20/9/22, 8:05	W		2	X							
2	1200_MW021_220920	" , 8:55	W		2	X							
3	1200_MW019_220920	" , 9:05	W		2	X							
4	1200_MW018_220920	" , 9:20	W		2	X							
5	1200_MW080_220920	" , 9:45	W		2	X							
6	1200_MW04D_220920	" , 10:00	W		2	X							
7	1200_MW01_220920	" , 10:20	W		2	X							
8	1200_MW020_220920	" , 1035	W		2	X							
9	1200_MW017_220920	" , 1040	W		2	X							
10	1200_MW034_220920	" , 1105	W		2	X							
11	1200_MW066_220920	" , 1120	W		2	X							
12	1200_MW031_220920	" , 1140	W		2	X							
				TOTAL	24								

Environmental Division
Sydney
Work Order Reference
ES2234122

Telephone : + 61-2-8784 8555

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ✱ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	ALS QUOTE NO.: SY/139/19 V3	Custody Seal Intact?	Yes No N/A
PROJECT: NT_0990_PFASOMP		Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER: [redacted]	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER: [redacted] CONTACT PH [redacted]		Other comment:	
SAMPLER [redacted] SAMPLER MOBILE: [redacted]			
COC emailed to ALS? (YES / NO) EDD FORMAT (or default):	RELINQUISHED BY:	RECEIVED B [redacted]	RELINQUISHED BY:	RECEIVED BY:
[redacted] om;	DATE/TIME:	DATE/TIME: 21/09 @3:25 pm	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed) [redacted]				
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Forward QC200s to NMI Sydney				

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	Sample ID: 0990_MWXXX_220XXX	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	1200_MW029_220920	20/9/22, 1155	W		2	X								
NA 14	1200_MW034_220920	" , 1240	W		2	X								
15	1200_QC100_220920	" , 1000	W		2	X								
* 16	1200_QC200_220920	" , 1000	W		2	X								Please Send to NMI
17	1200_QC101_220920	" , 1045	W		2	X								
* 18	1200_QC201_220920	" , 1045	W		2	X								Please Send to NMI
19	1200_QC300_220920	" , 1155	W		2	X								
20	1200_QC400_220920	"	W		2	X								
21	1200_QC500_220920	"	W		2	X								
22	1200_QC401_220921	21/9/22	W		2	X								
23	1200_QC501_220921	"	W		2	X								
24	1200_MW024_220921	"	W		2	X								
					24									

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☒ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE:	ALS QUOTE NO.: SY/139/19 V3	COC SEQUENCE NUMBER (Circle)	Custody Seal Intact? Yes No N/A
PROJECT: NT_0990_PFASOMP		COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: [redacted]		OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: [redacted]	CONTACT PH: [redacted]		Other comment:
SAMPLER: [redacted]	SAMPLER MOBILE: [redacted]		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
[redacted]			
Email Invoice to (will default to PM if no other addresses are listed): [redacted]			

RELINQUISHED BY:	RECEIVED BY: [redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME: 21/09 @ 3:25 pm	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Forward QC200s to NMI Sydney

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	Sample ID: 0990_MWXXX_220XXX	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	~~[redacted]~~													
25	1200_MW112_220921	21/9/22, 1115	W		2	X								
26	1200_MW113_220921	11 , 1120	W		2	X								
Exn 27	1200-MW130-220920	1210	W											
					Total	50								

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2234122**		
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: [redacted] NSW Australia 2164
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ---	Telephone	: +61 2 8784 8555
Facsimile	: ---	Facsimile	: +61-2-8784 8500
Project	: NT_1200_PFASOMP	Page	: 1 of 3
Order number	: [redacted]	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: [redacted]		

Dates

Date Samples Received	: 26-Sep-2022 06:30	Issue Date	: 07-Oct-2022
Client Requested Due Date	: 04-Oct-2022	Scheduled Reporting Date	: **04-Oct-2022**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 14.6'C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 24 / 23
		No. of samples NOT collected	1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- This is an updated SRN to correct the Project ID.
- **Sample MW030_220920 was received extra and placed on hold.**
- **Samples QC200 and QC201 have been forwaded to NMI.**
- **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.**
- Sample 1200_MW034_220920 was not received due to the following reason: sample not received
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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.

ES2234122-025 : 20-Sep-2022 11:40 : 1200_MW030_220920 - extra

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	(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2234122-001	20-Sep-2022 07:35	1200_MW032_220920		✓
ES2234122-002	20-Sep-2022 08:25	1200_MW021_220920		✓
ES2234122-003	20-Sep-2022 08:35	1200_MW021D_220920		✓
ES2234122-004	20-Sep-2022 08:50	1200_MW018_220920		✓
ES2234122-005	20-Sep-2022 09:15	1200_MW080_220920		✓
ES2234122-006	20-Sep-2022 09:30	1200_MW004D_220920		✓
ES2234122-007	20-Sep-2022 09:50	1200_MW001_220920		✓
ES2234122-008	20-Sep-2022 10:05	1200_MW012D_220920		✓
ES2234122-009	20-Sep-2022 10:10	1200_MW012_220920		✓
ES2234122-010	20-Sep-2022 10:35	1200_MW034_220920		✓
ES2234122-011	20-Sep-2022 10:50	1200_MW066_220920		✓
ES2234122-012	20-Sep-2022 11:10	1200_MW031_220920		✓
ES2234122-013	20-Sep-2022 11:25	1200_MW029_220920		✓
ES2234122-015	20-Sep-2022 09:30	1200_QC100_220920		✓
ES2234122-016	20-Sep-2022 10:15	1200_QC101_220920		✓
ES2234122-017	20-Sep-2022 11:25	1200_QC300_220920		✓
ES2234122-018	20-Sep-2022 00:00	1200_QC400_220920		✓
ES2234122-019	20-Sep-2022 00:00	1200_QC500_220920		✓
ES2234122-020	21-Sep-2022 00:00	1200_QC401_220921		✓
ES2234122-021	21-Sep-2022 00:00	1200_QC501_220921		✓
ES2234122-022	21-Sep-2022 00:00	1200_MW024_220921		✓
ES2234122-023	21-Sep-2022 10:45	1200_MW112_220921		✓
ES2234122-024	21-Sep-2022 10:50	1200_MW113_220921		✓
ES2234122-025	20-Sep-2022 11:40	1200_MW030_220920 e...	✓	

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

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

[redacted]
[redacted]DAT) Email [redacted]
[redacted]
- EDI Format - ESD[redacted]
[redacted]
- *AU Certificate of Analysis - NATA (COA) Email
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email
- Chain of Custody (CoC) (COC) Email
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM) Email
- EDI Format - ESDAT (ESDAT) Email
- EDI Format - XTab (XTAB) Email

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2234122**	Page	: 1 of 13
Amendment	: **2**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted] DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 26-Sep-2022 06:30
Order number	: [redacted]	Date Analysis Commenced	: 27-Sep-2022
C-O-C number	: —	Issue Date	: 13-Oct-2022 14:06
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/139/19 V3		
No. of samples received	: 25		
No. of samples analysed	: 24		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, 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*
[redacted]	Organic Chemist	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.

- 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.
- EP231X: Poor Matrix Spike (MS) recoveries is due to sample matrix and matrix interferences.
- EP231X: Positive result for analyte Perfluoropentanoic acid (PFPeA) on sample ES2234122_013 has been confirmed by re-extraction and re-analysis.
- Amendment (07/10/2022)):This report has been amended to correct sample 6 and 7 ID's and changing order number to 60612561/2.1.
- Amendment (11/10/2022):This report has been amended to schedule sample 25 (1200_MW030_220920) for PFAS analysis.
- 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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW032_220920	1200_MW021_220920	1200_MW021D_220920	1200_MW018_220920	1200_MW080_220920
				Sampling date / time	20-Sep-2022 07:35	20-Sep-2022 08:25	20-Sep-2022 08:35	20-Sep-2022 08:50	20-Sep-2022 09:15
					ES2234122-001	ES2234122-002	ES2234122-003	ES2234122-004	ES2234122-005
					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		**0.03**	<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		**0.05**	<0.01	<0.01	<0.01	**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		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.03**	<0.02	<0.02	<0.02	**0.03**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.03**	<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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW032_220920	1200_MW021_220920	1200_MW021D_220920	1200_MW018_220920	1200_MW080_220920
				Sampling date / time	20-Sep-2022 07:35	20-Sep-2022 08:25	20-Sep-2022 08:35	20-Sep-2022 08:50	20-Sep-2022 09:15
					ES2234122-001	ES2234122-002	ES2234122-003	ES2234122-004	ES2234122-005
					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		**0.14**	<0.01	<0.01	<0.01	**0.10**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.08**	<0.01	<0.01	<0.01	**0.07**
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.14**	<0.01	<0.01	<0.01	**0.10**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**98.1**	**97.3**	**96.6**	**91.4**	**102**
13C8-PFOA	---	0.02	%		**98.2**	**95.4**	**97.4**	**95.3**	**98.5**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW004D_220920	1200_MW001_220920	1200_MW012D_220920	1200_MW012_220920	1200_MW034_220920
				Sampling date / time	20-Sep-2022 09:30	20-Sep-2022 09:50	20-Sep-2022 10:05	20-Sep-2022 10:10	20-Sep-2022 10:35
					ES2234122-006	ES2234122-007	ES2234122-008	ES2234122-009	ES2234122-010
					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	**0.06**	<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	**0.11**	<0.01	<0.01	**0.08**
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	**0.04**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.04**
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: WATER (Matrix: WATER)				Sample ID	1200_MW004D_220920	1200_MW001_220920	1200_MW012D_220920	1200_MW012_220920	1200_MW034_220920
				Sampling date / time	20-Sep-2022 09:30	20-Sep-2022 09:50	20-Sep-2022 10:05	20-Sep-2022 10:10	20-Sep-2022 10:35
Compound	CAS Number	LOR	Unit		ES2234122-006	ES2234122-007	ES2234122-008	ES2234122-009	ES2234122-010
					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	**0.17**	<0.01	<0.01	**0.19**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.17**	<0.01	<0.01	**0.11**
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.17**	<0.01	<0.01	**0.19**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**99.2**	**97.1**	**94.5**	**100**	**94.1**
13C8-PFOA	---	0.02	%		**100**	**95.6**	**97.7**	**96.8**	**95.3**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW066_220920	1200_MW031_220920	1200_MW029_220920	1200_QC100_220920	1200_QC101_220920
				Sampling date / time	20-Sep-2022 10:50	20-Sep-2022 11:10	20-Sep-2022 11:25	20-Sep-2022 09:30	20-Sep-2022 10:15
					ES2234122-011	ES2234122-012	ES2234122-013	ES2234122-015	ES2234122-016
					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		**0.14**	<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		**0.39**	<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		**0.03**	<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		**0.02**	<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: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW066_220920	1200_MW031_220920	1200_MW029_220920	1200_QC100_220920	1200_QC101_220920
				Sampling date / time	20-Sep-2022 10:50	20-Sep-2022 11:10	20-Sep-2022 11:25	20-Sep-2022 09:30	20-Sep-2022 10:15
					ES2234122-011	ES2234122-012	ES2234122-013	ES2234122-015	ES2234122-016
					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		**0.58**	<0.01	**0.02**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.53**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.58**	<0.01	**0.02**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**100**	**89.9**	**97.5**	**98.4**	**97.3**
13C8-PFOA	---	0.02	%		**98.2**	**97.1**	**96.5**	**94.1**	**96.8**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_QC300_220920	1200_QC400_220920	1200_QC500_220920	1200_QC401_220921	1200_QC501_220921
				Sampling date / time	20-Sep-2022 11:25	20-Sep-2022 00:00	20-Sep-2022 00:00	21-Sep-2022 00:00	21-Sep-2022 00:00
					ES2234122-017	ES2234122-018	ES2234122-019	ES2234122-020	ES2234122-021
					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: WATER (Matrix: WATER)				Sample ID	1200_QC300_220920	1200_QC400_220920	1200_QC500_220920	1200_QC401_220921	1200_QC501_220921
				Sampling date / time	20-Sep-2022 11:25	20-Sep-2022 00:00	20-Sep-2022 00:00	21-Sep-2022 00:00	21-Sep-2022 00:00
Compound	CAS Number	LOR	Unit		ES2234122-017	ES2234122-018	ES2234122-019	ES2234122-020	ES2234122-021
					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	%		**93.9**	**100**	**93.5**	**93.6**	**89.5**
13C8-PFOA	---	0.02	%		**92.8**	**95.4**	**95.3**	**96.5**	**96.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW024_220921	1200_MW112_220921	1200_MW113_220921	1200_MW030_220920 extra	—
				Sampling date / time	21-Sep-2022 00:00	21-Sep-2022 10:45	21-Sep-2022 10:50	20-Sep-2022 11:40	--
Compound	CAS Number	LOR	Unit		ES2234122-022	ES2234122-023	ES2234122-024	ES2234122-025	----
					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	**0.05**	--
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	**0.11**	--
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: WATER (Matrix: WATER)				Sample ID	1200_MW024_220921	1200_MW112_220921	1200_MW113_220921	1200_MW030_220920 extra	---
				Sampling date / time	21-Sep-2022 00:00	21-Sep-2022 10:45	21-Sep-2022 10:50	20-Sep-2022 11:40	---
Compound	CAS Number	LOR	Unit		ES2234122-022	ES2234122-023	ES2234122-024	ES2234122-025	-----
					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	**0.16**	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.16**	---
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	<0.01	<0.01	**0.16**	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**110**	**106**	**114**	**108**	---
13C8-PFOA	---	0.02	%		**102**	**98.7**	**103**	**101**	---

Surrogate Control Limits

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

Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA

REPORT OF ANALYSIS

Report No. RN1368685

Client	: AECOM AUSTRALIA PTY LTD	**Job No.**	: AECO06/220928
	[redacted]	**Quote No.**	: QT-02018
	[redacted]	**Order No.**	[redacted]
		Date Received	: 28-SEP-2022
Attention	: [redacted]	**Sampled By**	: CLIENT
Project Name	: NT_1200_PFASOMP		
Your Client Services Manager	: D[redacted]	**Phone**	: [redacted]

Lab Reg No.	Sample Ref	Sample Description
N22/019166	1200_QC200_220920	WATER 20/09/2022 10:00
N22/019167	1200_QC201_220920	WATER 20/09/2022 10:45

Lab Reg No.		N22/019166	N22/019167			
Date Sampled		20-SEP-2022	20-SEP-2022			
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05	<0.05			NR70
PFPeA (2706-90-3)	ug/L	<0.02	<0.02			NR70
PFHxA (307-24-4)	ug/L	<0.01	<0.01			NR70
PFHpA (375-85-9)	ug/L	<0.01	<0.01			NR70
PFOA (335-67-1)	ug/L	<0.01	<0.01			NR70
PFNA (375-95-1)	ug/L	<0.01	<0.01			NR70
PFDA (335-76-2)	ug/L	<0.01	<0.01			NR70
PFUdA (2058-94-8)	ug/L	<0.01	<0.01			NR70
PFDoA (307-55-1)	ug/L	<0.01	<0.01			NR70
PFTrDA (72629-94-8)	ug/L	<0.02	<0.02			NR70
PFTeDA (376-06-7)	ug/L	<0.02	<0.02			NR70
PFHxDA (67905-19-5)	ug/L	<0.02	<0.02			NR70
PFODA (16517-11-6)	ug/L	<0.05	<0.05			NR70
FOUEA (70887-84-2)	ug/L	<0.01	<0.01			NR70
PFDS (335-77-3)	ug/L	<0.01	<0.01			NR70
PFPeS (2706-91-4)	ug/L	<0.01	<0.01			NR70
PFHxS (355-46-4)	ug/L	<0.01	<0.01			NR70
PFHpS (375-92-8)	ug/L	<0.01	<0.01			NR70
PFOS (1763-23-1)	ug/L	<0.02	<0.02			NR70
PFNS (68259-12-1)	ug/L	<0.01	<0.01			NR70
PFBS (375-73-5)	ug/L	<0.01	<0.01			NR70
PFOSA (754-91-6)	ug/L	<0.01	<0.01			NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02	<0.02			NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02	<0.02			NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01	<0.01			NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01	<0.01			NR70
N-MeFOSE (24448-09-7)	ug/L	<0.05	<0.05			NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05	<0.05			NR70
4:2 FTS (757124-72-4)	ug/L	<0.01	<0.01			NR70

REPORT OF ANALYSIS

Report No. RN1368685

Lab Reg No.		N22/019166	N22/019167			
Date Sampled		20-SEP-2022	20-SEP-2022			
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
6:2 FTS (27619-97-2)	ug/L	<0.01	<0.01			NR70
8:2 FTS (39108-34-4)	ug/L	<0.01	<0.01			NR70
10:2 FTS (120226-60-0)	ug/L	<0.01	<0.01			NR70
8:2 diPAP (678-41-1)	ug/L	<0.02	<0.02			NR70
PFBA (Surrogate Recovery)	%	147	139			NR70
PFPeA (Surrogate Recovery)	%	145	141			NR70
PFHxA (Surrogate Recovery)	%	150	148			NR70
PFHpA (Surrogate Recovery)	%	147	143			NR70
PFOA (Surrogate Recovery)	%	152	141			NR70
PFNA (Surrogate Recovery)	%	148	141			NR70
PFDA (Surrogate Recovery)	%	150	143			NR70
PFUdA (Surrogate Recovery)	%	148	141			NR70
PFDoA (Surrogate Recovery)	%	134	125			NR70
PFTeDA (Surrogate Recovery)	%	141	134			NR70
PFHxDA (Surrogate Recovery)	%	193	168			NR70
FOUEA (Surrogate Recovery)	%	149	121			NR70
PFBS (Surrogate Recovery)	%	137	130			NR70
PFHxS (Surrogate Recovery)	%	143	139			NR70
PFOS (Surrogate Recovery)	%	145	133			NR70
PFOSA (Surrogate Recovery)	%	140	132			NR70
N-MeFOSA (Surrogate Recovery)	%	125	108			NR70
N-EtFOSA (Surrogate Recovery)	%	125	111			NR70
N-MeFOSAA (Surrogate Recovery)	%	136	131			NR70
N-EtFOSAA (Surrogate Recovery)	%	130	126			NR70
N-MeFOSE (Surrogate Recovery)	%	132	120			NR70
N-EtFOSE (Surrogate Recovery)	%	135	121			NR70
4:2 FTS (Surrogate Recovery)	%	143	131			NR70
6:2 FTS (Surrogate Recovery)	%	128	115			NR70
8:2 FTS (Surrogate Recovery)	%	119	110			NR70
8:2 diPAP (Surrogate Recovery)	%	237	196			NR70
Dates						
Date extracted		5-OCT-2022	5-OCT-2022			
Date analysed		5-OCT-2022	5-OCT-2022			

N22/019166
to
N22/019167

PFOS and PFHxS are quantified using a combined branched and linear standard,

REPORT OF ANALYSIS

linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

Selected PFAS surrogate recoveries are biased due to matrix effects.ô
High PFAS surrogate recoveries accepted - results corrected for recovery.

[redacted]
Organics - NSW
Accreditation No. 198

13-OCT-2022

NATA
WORLD RECOGNISED
ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) as received and tested.

This Report supersedes reports: *RN1368000*
RN1368001

Measurement Uncertainty is available upon request.

Note: Sampling date(s) have been provided by the client.
Chemical Accreditation 198: [redacted]

[redacted]

AECO06/220928 AO ✓ 7/10

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

CLIENT: AECOM	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	⊗ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: [redacted]		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: NT_0990_PFASOMP	ALS QUOTE NO.: SY/139/19 V3	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 60612561 / 3.1		OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
[redacted]			Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME: 21/09 @3:25 pm	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Forward QC200s to NMI Sydney

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	Sample ID: 0990_MWXXX_220XXX	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	1200_MW029_220920	20/9/22, 1155	W		2	X								
NA 14	1200_MW034_220920	" , 1240	W		2	X								
15	1200_QC100_220920	" , 1000	W		2	X								
* 16	1200_QC200_220920	" , 1000	W	N22/019166	2	X								Please send to NMI
17	1200_QC101_220920	" , 1045	W		2	X								
* 18	1200_QC201_220920	" , 1045	W	N22/019167	2	X		* 1200 ??						Please send to NMI
19	1200_QC300_220920	" , 1155	W		2	X								
20	1200_QC400_220920	"	W		2	X		DOES NOT MATCH						
21	1200_QC500_220920	"	W		2	X		PROJECT						
22	1200_QC401_220921	21/9/22	W		2	X								
23	1200_QC501_220921	"	W		2	X								
24	1200_MW024_220921	"	W		2	X								
				TOTAL	24									

RECEIVED 28 SEP 2022 BY: [redacted]

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

Australian Government
Department of Industry, Science and Resources

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

Attention: [redacted]

Customer: AECOM AUSTRALIA PTY LTD

Address: LEVEL 8
FORTITUDE VALLEY QLD 4006

Email: [redacted]

Telephone:

Fax:

LABORATORY DETAILS

Lab: [redacted]National Measurement Institute

Contact: [redacted]

Address: 105 Delhi Road, North Ryde, NSW
NSW 2113

Email: [redacted]u

Telephone: 02 9449 0181

Fax:

SAMPLE DETAILS

NMI Job Name: AECO06/220928

Total No. of Samples: 2

LRNs	Estimated Report Date	Customer Sample ID	Lab Sample Description
N22/019166	7-OCT-2022	1200_QC200_220920	WATER 20/09/2022 10:00

SAMPLE RECEIVED CONDITION

Date samples received:	28-SEP-2022
Sample received in good order:	Yes
NMI Quotation no. provided:	
Client purchase order number:	60612561_3_1
Temperature of samples:	Chilled
Comments:	
Mode of Delivery:	Courier

Additional Terms and Conditions

Incomplete / unclear information about samples or required testing will delay the start of the analysis work.

If you require your Purchase Order (PO) number to be included on our invoice, please provide the number during sample submission and before the completion of work to avoid unnecessary delays and/or additional processing/handling fees.

The lodgement of an order or receipt of samples for NMI services referenced in this Sample Receipt Notification constitutes an acceptence of the current version of NMI Terms and Conditions or other applicable Terms referenced in the NMI Quotation. NMI Terms and Conditions are available on the web at https://www.industry.gov.au/client-services/testing-and-analysis-services/chemical-and-biological-analysis-services-terms-and-conditions

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/220928 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.05	< 0.05	NA	NA	NA	134	NA
PFPeA (2706-90-3)	NR70	0.02	< 0.02	NA	NA	NA	104	NA
PFHxA (307-24-4)	NR70	0.01	< 0.01	NA	NA	NA	111	NA
PFHpA (375-85-9)	NR70	0.01	< 0.01	NA	NA	NA	109	NA
PFOA (335-67-1)	NR70	0.01	< 0.01	NA	NA	NA	102	NA
PFNA (375-95-1)	NR70	0.01	< 0.01	NA	NA	NA	113	NA
PFDA (335-76-2)	NR70	0.01	< 0.01	NA	NA	NA	106	NA
PFUdA (2058-94-8)	NR70	0.01	< 0.01	NA	NA	NA	106	NA
PFDoA (307-55-1)	NR70	0.01	< 0.01	NA	NA	NA	116	NA
PFTrDA (72629-94-8)	NR70	0.02	< 0.02	NA	NA	NA	110	NA
PFTeDA (376-06-7)	NR70	0.02	< 0.02	NA	NA	NA	116	NA
PFHxDA (67905-19-5)	NR70	0.02	< 0.02	NA	NA	NA	107	NA
PFODA (16517-11-6)	NR70	0.05	< 0.05	NA	NA	NA	101	NA
FOUEA (70887-84-2)	NR70	0.01	< 0.01	NA	NA	NA	111	NA
PFBS (375-73-5)	NR70	0.01	< 0.01	NA	NA	NA	103	NA
PFPeS (2706-91-4)	NR70	0.01	< 0.01	NA	NA	NA	103	NA
PFHxS (355-46-4)	NR70	0.01	< 0.01	NA	NA	NA	106	NA
PFHpS (375-92-8)	NR70	0.01	< 0.01	NA	NA	NA	108	NA
PFOS (1763-23-1)	NR70	0.02	< 0.02	NA	NA	NA	108	NA
PFNS (68259-12-1)	NR70	0.01	< 0.01	NA	NA	NA	105	NA
PFDS (335-77-3)	NR70	0.01	< 0.01	NA	NA	NA	100	NA
PFOSA (754-91-6)	NR70	0.01	< 0.01	NA	NA	NA	108	NA
N-MeFOSA (31506-32-8)	NR70	0.02	< 0.02	NA	NA	NA	109	NA
N-EtFOSA (4151-50-2)	NR70	0.02	< 0.02	NA	NA	NA	104	NA
N-MeFOSAA (2355-31-9)	NR70	0.01	< 0.01	NA	NA	NA	120	NA
N-EtFOSAA(2991-50-6)	NR70	0.01	< 0.01	NA	NA	NA	112	NA
N-MeFOSE (24448-09-7)	NR70	0.05	< 0.05	NA	NA	NA	105	NA
N-EtFOSE (1691-99-2)	NR70	0.05	< 0.05	NA	NA	NA	110	NA
4:2 FTS (757124-72-4)	NR70	0.01	< 0.01	NA	NA	NA	115	NA
6:2 FTS (27619-97-2)	NR70	0.01	< 0.01	NA	NA	NA	110	NA
8:2 FTS (39108-34-4)	NR70	0.01	< 0.01	NA	NA	NA	122	NA
10:2 FTS (120226-60-0)	NR70	0.01	< 0.01	NA	NA	NA	107	NA
8:2 diPAP (678-41-1)	NR70	0.02	< 0.02	NA	NA	NA	126	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA' = Not Applicable.
RPD= Relative Percentage Difference.

Signed: [redacted]

Date:

Prepared for
Department of Defence Directorate of PFAS Remediation Environment and Engineering Branch
ABN: 68706814312

AECOM

Wet Season Sampling Event Factual Report, 2023

PFAS OMP - Robertson Barracks

01-Sep-2023
PFAS Ongoing Monitoring Plan

Art by
Bianca Gardiner Dodd

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Delivering a better world

Wet Season Sampling Event Factual Report, 2023

PFAS OMP - Robertson Barracks

Client: Department of Defence Directorate of PFAS Remediation Environment and Engineering Branch

ABN: 68706814312

Prepared by

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01-Sep-2023

Job No.: 60612561

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Quality Information

Document	Wet Season Sampling Event Factual Report, 2023
Ref	60612561
Date	01-Sep-2023
Prepared by	[redacted]
Checker/s	
Verifier/s	

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
0	01-Sep-2023	Final	[redacted] Principal Environmental Scientist	[redacted]

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Abbreviations

Term	Description
AECOM	AECOM Australia Pty Ltd
ALS	ALS Environmental Pty Ltd
ASC NEPM	National Environment Protection Council 1999, National Environment Protection (Assessment of Site Contamination) Measure, Amendment 1 2013
AS/ANZ	Australia/New Zealand Standard®
DCMM	Defence Contamination Management Manual
DO	Dissolved oxygen
DoH	Department of Health
DQO	Data quality objectives
DQI	Data quality indicators
EC	Electrical conductivity
HEPA	Heads of Environmental Protection Agencies
LOR	Limit of reporting
NATA	National Association of Testing Authorities
NEMP 2.0	National Environmental Management Plan
NMI	National Measurement Institute
NT	Northern Territory
NSW	New South Wales
OMP	Ongoing Monitoring Plan
ORP	Oxidation-reduction potential
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
QA/QC	Quality Assurance/Quality Control
SBRS	Shoal Bay Receiving Station
SAQP	Sampling Analysis Quality Plan
SWL	Standing Water Level
TDS	Total dissolved solids

List of Units

Unit	Definition
°C	degrees Celsius
cm	centimetre
mm	millimetre
L	litre
m	metre
mAHD	metres Australian Height Datum
mbtoc	metres below top of casing
mg	milligrams
mV	millivolts
µg	micrograms
µS	micro siemens
NTU	Nephelometric Turbidity Unit

1.0 Introduction

1.1 General

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances (PFAS) Ongoing Monitoring Plan (OMP) outlined in the *PFAS Management Area Plan (PMAP)* (Department of Defence, 2018) at Robertson Barracks (the 'Base') in the Northern Territory (NT). The location of the Base and Management Area is shown in **Figure 1** in **Appendix A**. The OMP (Department of Defence, 2023) for the Base outlines the requirement to complete groundwater and surface water sampling biannually.

The primary purpose of the OMP (Department of Defence, 2023) is to monitor changes to the PFAS impact in groundwater and surface water associated with sources of PFAS as initially assessed through the detailed site investigation phase of works. Changes may result from the specific or cumulative impact of remediation or containment actions, existing transportation trends, and changes to hydrogeology or weather events.

The monitoring plan at Robertson Barracks includes a regime of groundwater and surface water sampling to capture these changes in the long term, to enable Defence to maintain an up-to-date understanding of temporal and spatial distribution, concentration, and transport of PFAS contaminants.

This report details the scope and findings of 2022-2023 wet season monitoring activities, which were completed between November 2022 and March 2023.

1.2 Objectives

As noted above, the objective of the *PFAS OMP* (Department of Defence, 2023) is to provide information on changes to PFAS contamination originating from Defence property to inform risk management decisions by Defence to protect human health and the environment.

The purpose of this PFAS OMP factual report is to summarise the scope of works and findings for the November 2022 surface water and March 2023 groundwater and surface water sampling events, conducted in accordance with the Sampling and Analysis Quality Plan (SAQP) (AECOM, 2022).

This report has been prepared in accordance with the *Defence PFAS OMP Factual Reports Guidance,* Version 0.2, May 2021 (Department of Defence, 2021a). An annual interpretive report will be subsequently developed for the purpose of assessing the data collected during the discrete monitoring events completed over the preceding 12-month period (September 2022 through April 2023) and will include assessment of environmental variability and any statistically significant trends in PFAS concentrations.

2.0 Scope of work

The sampling event was completed in general accordance with the SAQP (AECOM, 2022). Prior to commencement of the sampling events, the SAQP (AECOM, 2022), was reviewed to ensure compliance with the following:

- Heads of the Environment Protection Authority (HEPA), PFAS National Environmental Management Plan (NEMP 2.0) (HEPA, 2020)
- National Environment Protection Council 1999, National Environment Protection (Assessment of Site Contamination) Measure, Amendment 1 2013 (ASC NEPM, 2013)
- Defence OMP (Department of Defence, 2023)
- Defence Routine Environment Water Quality Monitoring Manual (Department of Defence, 2019)
- AS/NZS 5667:1998 Water quality – Sampling (AS/NZS, 1998)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)
- Relevant Northern Territory regulatory guidelines.

In summary, the scope of works completed for the wet season sampling included:

- November 2022:
  - Collection of surface water samples from nine planned sampling locations (refer **Table 2** below, and **Figure 2** in **Appendix A,** for specific locations).
- March 2023:
  - Collection of groundwater samples (including gauging of groundwater levels) from 16 existing monitoring wells using HydraSleeves™
  - Collection of groundwater samples from two existing extraction bores by collecting grab samples from taps (refer to **Table 1** below, and **Figure 1** in **Appendix A**, for specific locations).
  - Collection of surface water samples from eight of nine planned sampling locations (refer to **Table 2** below, and **Figure 2** in **Appendix A,** for specific locations). One surface water sample location was dry therefore unable to be sampled during this sampling event.
- Collection of intra- and inter-laboratory duplicate samples at a rate of 1 in 10 primary samples, one rinsate, one field blank sample per sampling day and one trip blank per cooler per event.
- Analysis of all samples for a suite of 28 PFAS analytes at the standard limit of reporting (LOR).
- Data management of the OMP field and laboratory data in the Defence ESdat database.
- Preparation of this Sampling Event Factual Report.

2.1 Planned monitoring locations

The monitoring locations outlined within the relevant SAQP **(AECOM, 2022)** for the groundwater sampling and surface water events are tabulated below. Deviations from the planned sampling are highlighted in bold and detailed in Section 2.2 below.

Table 1 Groundwater sampling locations

Area	Description	Sampling Locations	Number of wells/ bores	Total
On-Base	North-eastern Boundary of Base	MW034	1	8
	Source Area 1	MW066	1	
	Source Area 2	MW004, MW004D	2	

Area	Description	Sampling Locations	Number of wells/ bores	Total
	Up gradient Source Area 1	MW012, MW012D	2	
	Up gradient Source Area 2	MW080	1	
	Cross-gradient of source areas 2 and 3	MW001	1	
Off-Base	Thorngate Road – Northern Boundary	MW032	1	10
	Down gradient Source 1	MW023	1	
	Across gradient Source 1	MW021, MW021D	2	
	Down gradient Source 2 and 3	MW018, MW031	2	
	Cross-gradient of Source Area 2 and 3	MW029, MW030	2	
	Shoal Bay Receiving Station (SBRS) – extraction bores	MW112^, MW113^	2	

^ Extraction bores, and therefore not able to collect gauging data.

Table 2 Surface water sampling locations

Area	Description	Sampling Locations	Number of Locations	Total
On-Base	On-base drainage line, Southeast boundary	SW001	1	5
	On-base drainage line, Southwest boundary	SW007	1	
	On-base drainage line, Central	**SW023*,** SW028	2	
	On-base drainage line, Eastern boundary	SW059	1	
Off-Base	Northern Drainage Line	SW123	1	4
	Milner's Creek	SW086, SW091	2	
	Southern Drainage Channel	SW075	1	

*Location not sampled during March 2023 event. Refer to Table 3 and Table 11 for further details

2.2 Deviations from the SAQP

The works completed during this sampling event included deviations from the SAQP (AECOM, 2022) as outlined below in Table 3 below.

Table 3 Deviations from the SAQP

SAQP	Deviation	Impact to OMP
Sampling of nine surface water locations in March 2023.	During the March 2023 surface water event, eight of nine	Minor impact – data gap. However, other surface water samples were collected from

SAQP	Deviation	Impact to OMP
	surface water sample locations were sampled: • SW023 was dry for the duration of the sampling event and therefore not collected.	down-gradient locations which monitor PFAS mobilisation in surface water from up-gradient locations, reducing the impact of the data gap.
Collection of field parameters and observations at each sample location.	Field parameters were not collected during the March 2023 sampling event at the following locations: • Surface water sample locations SW028 and SW075; field parameters lost due to data collection fault. • Groundwater sample location MW023; insufficient water volume present. • Groundwater sample location MW112 and MW113, field parameters not collected due to field staff being given limited time to collect samples by Base escort and not gaining access to return to collect field parameters. • Observations of surface water body, specifically size of water body (stream width and depth), was not recorded during the November 2022 and March 2023 sapling events.	Minor impact – data gap. Field parameters and observations will be collected during future events.
In situ collection of field parameters at surface water locations.	Field parameters were collected ex situ for all surface water locations.	Immaterial impact – Field parameters are unlikely to be altered in any measurable way if surface water field parameters are collected immediately after removal from surface water source and stabilisation is achieved on the water quality meter. Ex situ collection of surface water field parameters reduces risk to field equipment and is a safer way to collect data for field staff. The SAQP will be revised to allow for this method of field parameter collection during the next SAQP update.

SAQP	Deviation	Impact to OMP
Quality Assurance/ Quality Control (QA/QC) samples	As per SAQP, one rinsate blank per piece of equipment per day is required. During March 2023 a rinsate was obtained each day, however the rinsate collected on 22 March 2023 was erroneously collected off equipment which had not been decontaminated voiding the sample.	Rinsate samples were collected appropriately, with the exception of 22 March 2023. The quality of the analytical data has still been assessed as acceptable, with any potential cross contamination considered unlikely based on the following: • Available rinsate and field blank samples reported results below the LOR. • Sampling equipment was either dedicated, disposable or decontaminated between each sample locations
Sediment sampling	No sediment samples were collected. The February 2023 version of the OMP removes sediment sampling from the scope and therefore is no longer required to be sampled. The next revision of the SAQP will be revised to remove sediment from the scope.	No impact

3.0 Sampling methodology

The methodology adopted for the sampling events in November 2022 and March 2023 was in accordance with the SAQP (AECOM, 2022) and is summarised **Table 4** below.

Table 4 Sampling methodology

Item	Details
Groundwater and surface water sampling methodology	
Groundwater gauging	Where accessible, the depth to groundwater was measured in each monitoring well within a 24-hour period, and then again immediately prior to collection of groundwater samples using an interface probe.
Field parameters	Where appropriate, groundwater and surface water field parameters were recorded ex-situ using a YSI Pro Water Quality Meter. Parameters recorded consisted of the following: temperature (°C), electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP) and pH. Observations of odour, colour and clarity (turbidity) of groundwater and surface water was recorded at each site. Further, surface water location stream flow rate and direction were recorded. Stream width and depth were not recorded during either surface water sampling event. Refer to Appendix C for the calibration certificates for the YSI Pro Water Quality Meter.
Water sampling methodology	Groundwater samples were collected from all accessible wells using no-purge methodology HydraSleeves™, which were installed within the screened interval of the wells for a minimum of 24 hours prior to sampling. HydraSleeve™ placement was based on a review of the well construction logs. Once sampling was completed, new HydraSleeves™ were redeployed within the screened interval in preparation for the next sampling round. Two extraction bores, MW112 and MW113, were sampled by grab sample from the headwork's tap. Surface water samples were collected from either mid-way through the water column or approximately 0.5 m below the surface (if possible) with care taken to minimise collection of sediment or floating materials in the samples. At each location, laboratory supplied bottles were lowered into the water using an aluminium sampling pole, with the cap immediately applied once the container was full and retrieved from the water.
Quality Assurance/ Quality Control (QA/QC) samples	Field QA/QC samples collected included intra-laboratory duplicate and inter-laboratory duplicate samples, rinsate blank, field blank, and trip blank samples. Refer to **Appendix D** for the data validation assessment of QA/QC sample data.
Sample analysis	Samples were submitted to the primary and secondary laboratories for analysis. ALS Environmental (ALS) Sydney, New South Wales (NSW) was used as the primary laboratory. The National Measurement Institute (NMI) of Sydney, NSW was used as the secondary laboratory. ALS and NMI methods for analyses were certified by the National Association of Testing Authorities (NATA). Laboratory certificates are presented in **Appendix E**

3.1 Adopted screening criteria

Screening criteria were selected on the basis of national guidance in the form of the PFAS National Environmental Management Plan, Defence estate and environmental strategies, and Defence PFAS-

specific strategies and guidance. Guidance documents used to assess the dataset includes the following:

- Heads of the Environment Protection Authority (HEPA), PFAS National Environmental Management Plan (NEMP 2.0) (HEPA, 2020)

'National Environment Protection Council 1999, National Environment Protection (Assessment of Site Contamination) Measure, Amendment 1 2013 (ASC NEPM, 2013)The adopted screening criteria which have been adopted for groundwater are presented **Table 5**.

Table 5 Summary of adopted screening criteria for groundwater

Pathway	Compound	Criteria	Comment/Reference
Human health receptors			
Drinking water - groundwater	Perfluorooctane sulfonate (PFOS) + Perfluorohexane sulfonic acid (PFHxS)	0.07 µg/L	These values are from the PFAS NEMP 2.0 (HEPA, 2020). *All groundwater results will be compared to these criteria.*
	Perfluorooctanoic acid (PFOA)	0.56 µg/L	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	These values are from Guidance on PFAS NEMP (HEPA, 2020). *All surface water results will be compared to these criteria.*
	PFOA	10 µg/L	
Ecological receptors			
Freshwater (99% species protection values)	PFOS	0.00023 µg/L	These values are from the PFAS NEMP 2.0 (HEPA, 2020). The 99% level of protection has been applied for slightly to moderately disturbed ecosystems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. For the purposes of preliminary screening of analytical water results, the laboratory LOR will be adopted rather than sole use of the criteria value. *All surface water and groundwater results will be compared to these criteria.*
	PFOA	19 µg/L	

3.2 Data quality objectives and data validation

The data quality objectives (DQOs) and data quality indicators (DQIs) adopted for these works are presented in the SAQP (AECOM, 2022).

Data validation assessment is provided in **Appendix D**.

Key findings from the data validation were as follows:

- The potential exists for concentrations of PFOS to be below the LOR (0.01 µg/L), but above the adopted freshwater ecosystem protection guideline value (0.00023 µg/L) and this should be taken into consideration when interpreting results. Specific locations meeting this criterion can be found in the analytical tables located in **Appendix B.**

Data validation procedures employed in the assessment of the field and laboratory QA/QC data are indicative that the overall quality of the analytical data produced is acceptably reliable for the purpose of

this report. An examination of sampling analysis data compared to the data validation findings did not result in any results that required flagging for potential inaccuracies.

All data collected during this event has been reviewed and uploaded to the Defence ESdat database in accordance with Defence Contamination Management Manual (DCMM) Annex L, August 2021 (Department of Defence, 2021b) requirements.

4.0 Field observations and results

4.1 General field observations

The following field observations were applicable across the entirety of the November 2022 and March 2023 sampling events.

Table 6 General field observations

Item	Observation
Weather conditions (November 2022)	Weather in general was observed to be hot, 31.3 – 34.4 °C, with high humidity throughout the day (57-97 %). Rainfall was recorded at the nearest rain gauging station (Darwin airport) on the sampling field dates of 24 and 28 November with 4.8 mm and 55.4 mm of rain recorded, respectively. A total of 377.6 mm was recorded between 1 July and 28 November 2022 (Darwin airport weather station, 014015).
Weather conditions (March 2023)	Weather in general was observed to be hot, 33.3 – 35.0 °C, with high humidity throughout the day (61-80 %). Rainfall was recorded at the nearest rain gauging station (Darwin airport) on the sampling field dates of 21, 22 and 23 March with less than one mm of rain recorded across all three days. A total of 1385.2 mm was recorded between 1 December 2022 and 23 March 2023 (Darwin airport weather station, 014015).
Estate Management Works or Training Activities	During the sampling event, no notable estate works, or training activities were observed in the vicinity of sampling locations. Base activities are not expected to have a material impact on sampling results.

4.2 Groundwater

4.2.1 Field observations and field measurements

Field data was collected on data forms and the data was uploaded into ESdat for development of report tables. Field data tables are presented in **Appendix B – Table T1.**

Table 7 Groundwater observations and field measurements

Item	Observations and field measurements
Fieldwork Dates	The groundwater sampling event was completed between 21, 22 and 23 March 2023.
Access and Sample Collection	All monitoring wells and bores were accessible and sampled. Monitoring locations MW112 and MW113 are extraction bores and samples were collected from the fitted taps. No standing water levels (SWL) were recorded at these locations.
Monitoring Well Network Condition	The monitoring well network was generally in good condition. Broken casing at MW023 was repaired prior to the sampling event and surveying had not been arranged at this location to measure the new TOC. Samples were able to be collected from this location, however there was insufficient water to collect parameters. MW023 will be resurveyed prior to the next monitoring event to be able to calculate standing water levels at this location.

Item	Observations and field measurements
Field Observations	Low turbidity and brown colouration was observed in most locations, with the exception of the extraction bore, MW066 , which had clear colourless water. No observations were recorded at MW112 and MW113 due to field staff being rushed by Base escort and forgetting to collect during sampling. An additional trip to collect this information was not able to be organised due to access restrictions in the area.
Depth to Groundwater and flow direction	Groundwater levels were recorded from 16 of 18 wells visited (monitoring locations MW112 and MW113 are production bores and not able to be gauged). Recorded depth to groundwater ranged from 0.590 (MW030) to 5.865 (MW023) metres below top of casing (mbTOC). Groundwater elevations in the Upper Bathurst Island Formation aquifer were calculated to be between 14.78 (MW034) and 24.12 (MW012) metres Australian Height Datum (mAHD). Groundwater gauging data is presented in **Appendix B – Table T1**. Inferred groundwater contours and groundwater flow directions at the site in March 2023 are shown in **Appendix A - Figure 3**. Inferred groundwater contouring suggests that groundwater in the shallow aquifer unit drains east and northeast towards Millner's Creek.
Field Parameters	Groundwater geochemical parameters were measured during sample collection from the HydraSleeve™ (or from the grab samples obtained from the taps) using a decontaminated YSI cup and YSI Pro Water Quality Meter. The readings are presented in **Appendix B - Table T1** and are summarised below: • Dissolved oxygen ranged from 0.55 mg/L (MW080) to 2.32 mg/L (MW021D). • Electrical conductivity ranged from 5.5 µS/cm (MW031) to 359 µS/cm (MW004D); all wells reported EC values below 400 µS/cm indicating a generally low salinity. • pH ranged from 4.38 (MW066) to 6.68 (MW004D) indicating acidic to neutral conditions. • Redox ranged from -11.0 mV (MW004D) to 205.7 mV (MW066) indicating oxidising to reducing conditions. Field parameters were not collected at MW023 due to insufficient water and MW112 and MW113 due to a sample collection error.

4.2.2 PFAS groundwater analytical results

During this sampling event, eight of the 18 groundwater locations sampled reported concentrations of PFAS above the laboratory LOR.

There were no first-time detections or new exceedances at any groundwater monitoring locations.

The PFAS groundwater analytical results from the March 2023 sampling event are summarised below (**Table 8**) and presented in **Appendix B – Table T2**.

Table 8 First-time detections of PFAS and exceedances of guidelines in groundwater

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		March 2023	Historical maximum	March 2023	Historical maximum	March 2023	Historical maximum
First-time detections of Sum of PFHxS + PFOS, PFOS or PFOA in groundwater (shaded blue).	There were no first-time detections of PFHxS + PFOS, PFOS or PFOA during this sampling event.						
New exceedance of human health criteria for sum of PFHxS + PFOS or PFOA in groundwater (shaded yellow).	There were no new exceedances of human health criteria in groundwater during this sampling event.						
New exceedance of ecological criteria for PFOS or PFOA in groundwater (shaded yellow).	There were no new exceedances of ecological criteria in groundwater during this sampling event.						

4.3 Surface water- November 2022

4.3.1 Field observations and field measurements

Table 9 Surface water observations and field measurements

Compound	Criteria
Fieldwork Dates	Surface water sampling was completed on 24 and 28 November 2022.
Access and Sample Collection	All surface water sampling locations were accessible and able to be sampled.
Contamination Observations	No obvious visible signs of contamination were observed.
Surface Water Flow	All off-Base surface water bodies (including the Close Training Area) had observable flow. On-Base drainage locations had moderate flow.

Compound	Criteria
Geochemical Parameters	Surface water geochemical parameters were measured prior to collecting surface water samples in November 2022. The stabilised readings are presented in **Table B3** in **Appendix B**, and are summarised below: • Dissolved Oxygen ranged from 1.51 (SW001) to 3.66 mg/L (SW075) indicating moderately oxygenated conditions. • Electrical conductivity ranged from 13.5 µS/cm (SW028) to 77.0 µS/cm (SW001) indicating freshwater conditions. Calculated Total Dissolved Solids (TDS) ranged from 8.8 mg/L to 50.1 mg/L from SW028 and SW001, respectively. • pH ranged from 5.84 (SW086) to 6.97 (SW023) indicating slightly acidic to neutral conditions. • Redox ranged from -123.3mV (SW059) to 103.3mV (SW007) indicating reducing to oxidising conditions. Temperature readings were not collected at monitoring locations SW059 and SW075 due to an error in the water quality meter.

4.3.2 PFAS surface water analytical results

During the sampling event five of the nine surface water locations sampled reported concentrations of PFAS above the laboratory LOR.

There were no first-time detections of Sum of PFHxS at any of the surface water monitoring locations. There were no first-time detections above the limit of reporting or screening criteria in the dataset.

The PFAS surface water analytical results from the November 2022 sampling event are presented below (**Table 10**), **Table T4** in **Appendix B** and spatially on **Figure 2** in **Appendix A**.

Table 10 First time detections of PFAS and exceedances of guidelines in November 2022 surface water

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		Nov 2022	Historical maximum	Nov 2022	Historical maximum	Nov 2022	Historical maximum
First time detections of Sum of PFHxS+PFOS, PFOS or PFOA in surface water (shaded blue).	There were no first-time detections of Sum of PFHxS+PFOS, PFOS or PFOA in surface water						
First time exceedance of human health criteria for sum of PFHxS+PFOS or PFOA in surface water (shaded yellow).	There were no first-time exceedances of human health criteria in groundwater during this sampling event.						
First time exceedance of ecological criteria for PFOS or PFOA in surface water (shaded yellow).	There were no first-time exceedances of ecological criteria for PFOS or PFOA in surface water during this sampling event.						

4.4 Surface water- March 2023

4.4.1 Field observations and field measurements

Table 11 Surface water observations and field measurements

Compound	Criteria
Fieldwork Dates	Surface water sampling was completed on 21, 22 and 23 March 2023.
Access and Sample Collection	All surface water sampling locations were accessible and able to be sampled, with the exception of SW023 which was observed to be dry.
Contamination Observations	No obvious visible signs of contamination were observed.
Surface Water Flow	All off-Base surface water bodies (including the Close Training Area) had observable flow. On-Base drainage locations had minor to moderate flow, in some cases only pools were available to sample from. One on-Base location, SW023 was completely dry.
Geochemical Parameters	Surface water geochemical parameters were measured prior to collecting surface water samples in March 2023. The stabilised readings are presented in **Table T5** in **Appendix B**, and are summarised below: • Dissolved oxygen ranged from 1.23 (SW001) to 5.62 mg/L (SW091) indicating moderate conditions. • Electrical conductivity ranged from 22.3 µS/cm (SW059) to 195.6 µS/cm (SW007) indicating freshwater conditions. Calculated TDS ranged from 15.1 mg/L to 127.1 mg/L from SW059 and SW007, respectively. • pH ranged from 5.01 (SW059) to 6.09 (SW091) indicating slightly acidic to neutral conditions. • Redox ranged from 31.6mV (SW007) to 149.2mV (SW059) indicating oxidising conditions. Field parameters are not available for SW028 and SW075 due to an electronic data collection technology fault.

4.4.2 PFAS surface water analytical results

During the sampling event, seven of the eight surface water samples reported concentrations of PFAS above the laboratory LOR.

There were no first-time detections of PFHxS+PFOS, PFOS or PFOA at any of the surface water monitoring locations. There were no new exceedances above the limit of screening criteria in the dataset.

The PFAS surface water analytical results from the March 2023 sampling event are presented below (**Table 12**), **Table T6** in **Appendix B** and spatially on **Figure 3** in **Appendix A**.

Table 12 First time detections of PFAS and exceedances of guidelines in surface water

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		March 2023	Historical maximum	March 2023	Historical maximum	March 2023	Historical maximum
First time detections of Sum of PFHxS+PFOS, PFOS or PFOA in surface water (shaded blue).	There were no first-time exceedances of Sum of PFHxS+PFOS, PFOS or PFOA in surface water during this sampling event.						
First time exceedance of	There were no first-time exceedances of human health criteria in groundwater during this sampling event.						

Type	Location ID	Sum of PFHxS + PFOS concentration (µg/L)		PFOA concentration (µg/L)		PFOS concentration (µg/L)	
		March 2023	Historical maximum	March 2023	Historical maximum	March 2023	Historical maximum
human health criteria for sum of PFHxS+PFOS or PFOA in surface water (shaded yellow).							
First time exceedance of ecological criteria for PFOS or PFOA in surface water (shaded yellow).	There were no first-time exceedances of ecological criteria ecological criteria for PFOS or PFOA in surface water during this sampling event.						

5.0 Summary and next sampling events

5.1 Summary of monitoring event

The wet season monitoring events were completed at the Base and publicly accessible land within the Management Area during two separate sampling events, at the start of the wet season 24 and 28 November 2022 and during the end of the wet season, 21 to 23 March 2023. The program included the following:

- Surface water sampling of nine planned sampling locations in November 2022
- Groundwater sampling of 18 planned monitoring wells in March 2023
- Surface water sampling from eight of nine planned sampling locations in March 2023.

The findings of the November 2022 and March 2023 sampling events and the recommended actions are summarised in **Table 13** below.

Table 13 Summary of Sampling Event

Item	Comment	Recommended Actions
Access to sampling locations	A surface water sample was not collected from location SW023 due to the sample location being dry.	Additional attempts will be made to collect surface water samples from SW023. Ongoing monitoring in accordance with the OMP.
Monitoring well network condition	The monitoring well network was generally in good condition. All surface sampling locations were accessible and appropriate for sampling. MW023 was repaired in July 2022 but was not surveyed. Arrangements will be made to survey this well prior to the next groundwater sampling event and the updated elevation data will be uploaded to ESdat.	No action required.
Analytical Results	PFAS concentrations were recorded above the LOR at eight of the 18 monitoring well locations sampled, five of nine surface water locations sampled in November 2022 and seven of eight surface water locations sampled in March 2023.	Ongoing monitoring in accordance with the OMP.
New exceedance of NEMP 2.0 drinking water and ecological guideline values in groundwater	No new exceedance of the NEMP 2.0 drinking water or ecological guideline values for PFHxS+PFOS, PFOS and PFOA during the November 2022 and March 2023 sampling events.	Ongoing monitoring in accordance with the OMP.
First-time detection of PFAS in groundwater	There were no first-time detections of PFHxS+PFOS, PFOS and PFOA in groundwater during the November 2022 and March 2023 sampling events.	Ongoing monitoring in accordance with the OMP.

Item	Comment	Recommended Actions
New exceedance of NEMP 2.0 drinking water and ecological guideline values at extraction bores at SBRS Facility	There were no new exceedances of PFHxS+PFOS, PFOS and PFOA in groundwater collected from extraction bores from the SBRS facility during the March 2023 sampling event.	Ongoing monitoring in accordance with the OMP.

5.2 Upcoming sampling events

The next sampling event is scheduled for September/October 2023 for the end of dry season groundwater event.

5.3 Upcoming annual interpretive report

The fourth annual interpretive report is scheduled to be delivered in the second half of 2023, covering the period from September 2022 to March 2023.

6.0 References

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Appendix A

Figures



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 100 200 400 600 800

metres

1:13,000 (when printed at A3)

LEGEND

- Surface Water Locations
- Management Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Note:
SW023 was dry during March 2023 event

Data sources:
Base data NT Gov 2019
GW data AECOM 2019

Department of Defence
ROBERTSON BARRACKS
PFAS ONGOING MONITORING PROGRAM
WET SEASON SAMPLING EVENT FACTUAL REPORT 2023

November 2022 and March 2023 Sampling Event

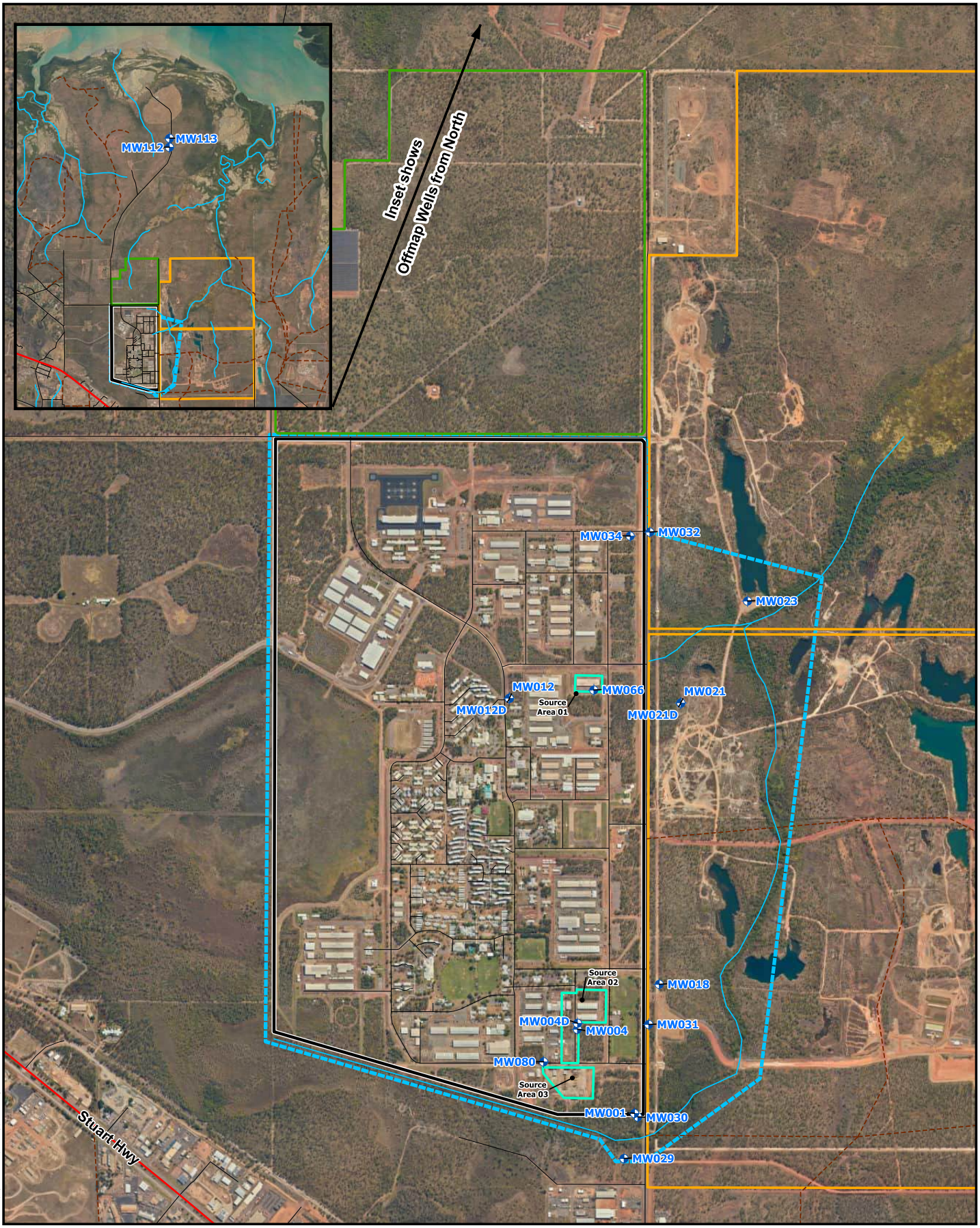
PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	FLETTN - 04 JUL 2023
VERSION:	1

Figure 1

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A3 size



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DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

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LEGEND

- Groundwater Monitoring Locations
- Management Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Highway
- Road
- Track

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

Department of Defence
ROBERTSON BARRACKS
PFAS ONGOING MONITORING PROGRAM
WET SEASON SAMPLING EVENT FACTUAL REPORT 2023

Groundwater Sampling Locations

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	FLETTN - 04 JUL 2023
VERSION:	1

Figure 2

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DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

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LEGEND

- Groundwater Monitoring Locations
- 75.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level
- Inferred Flow Direction
- Management Area
- Source Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range
- Watercourse
- Road
- Track

Note:
- MW001, MW004D, MW012D, MW021D, MW029, MW030, MW032, MW034 not included in contouring.
- Millner Creek to the south of the Base influences nearby groundwater flow direction, however overall groundwater flow direction is to the north-east.

Data sources:
Base data NT Gov 2022
GW data AECOM 2022

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ROBERTSON BARRACKS
PFAS ONGOING MONITORING PROGRAM
WET SEASON SAMPLING EVENT FACTUAL REPORT 2023

Groundwater Contours

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	FLETTN - 04 JUL 2023
VERSION:	1

Figure 3

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Appendix B

Tables

Table T1
Groundwater Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

March - Groundwater Field Results

AECOM

Location ID	Date	Depth to Water (mbTOC)	Well Depth (mbTOC)	TOC (mAHD)	Water Elevation (mAHD)	Condition of Gatic	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Redox (corr)(mV)	Temp (°C)	Turbidity (Visual)	Water Colour	Odour	Sheen	Sample Method
MW001	22/03/2023	1.110	7.88	23.20	22.09	Good	1.03	70.1	42.1	5.53	37.5	237.5	29.2	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW004	20/03/2023	2.844	4.10	23.87	21.03	Impacted with roots	0.62	45.8	27.5	4.71	121.2	321.2	29.8	High	Pale brown	Odourless	No sheen	Hydrasleeve
MW004D	22/03/2023	2.795	31.10	23.93	21.14	Good	1.17	359.0	215.4	6.68	-11.0	189.0	30.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012	22/03/2023	3.160	23.55	27.28	24.12	Good	0.78	59.7	35.8	5.29	73.1	273.1	32.2	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW012D	22/03/2023	4.780	NM	25.69	20.91	Good	2.25	55.2	33.1	5.18	72.8	272.8	31.8	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW018	22/03/2023	2.490	8.73	22.96	20.47	Good	1.99	65.7	39.4	5.53	67.7	267.7	30.3	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW021	22/03/2023	2.002	NM	16.03	18.03	Good	2.28	100.2	60.1	5.95	68.3	268.3	28.6	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW021D	22/03/2023	1.905	30.62	16.04	14.14	Good	2.32	151.2	90.7	6.07	70.8	270.8	28.4	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW023	22/03/2023	5.865	6.86	-	-	New TOC	Insufficient water to collect parameters											
MW029	22/03/2023	0.590	7.54	23.72	23.13	Good	0.88	68.4	41.0	5.45	58.0	258.0	30.8	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW030	22/03/2023	0.745	7.03	22.52	21.78	Good	1.97	56.6	34.0	5.00	75.7	275.7	29.3	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW031	22/03/2023	2.200	7.67	23.29	21.09	Good	1.16	5.5	3.3	5.54	65.8	265.8	30.2	Low	Pale brown	Odourless	No sheen	Hydrasleeve
MW032	22/03/2023	1.905	8.66	17.70	15.80	Good	1.32	48.0	28.8	5.16	65.9	265.9	30.8	Low	Light brown	Odourless	No sheen	Hydrasleeve
MW034	21/03/2023	2.230	11.80	17.01	14.78	Good	0.87	36.6	22.0	4.93	146.4	346.4	29.5	Moderate	Pale brown	Odourless	No sheen	Hydrasleeve
MW066	21/03/2023	2.722	11.94	20.28	17.56	New gatic	0.76	39.7	23.8	4.38	205.7	405.7	31.3	Low	Colourless	Odourless	No sheen	Hydrasleeve
MW080	21/03/2023	2.431	12.99	24.09	21.66	Good	0.55	48.7	29.2	4.73	117.3	317.3	29.6	Low	Pale brown	Odourless	No sheen	Hydrasleeve
MW112	22/03/2023	NM	NM	-	-	Tap	No parameters collected											Tap
MW113	22/03/2023	NM	NM	-	-	Tap	No parameters collected											Tap

Notes:
TOC for MW023 requires resurveying after new monument installed
mbTOC: metres below top of casing
mAHD: metres Australia Height Datum
NM: not measured
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table T2
Groundwater Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks Surrounds

Groundwater Analytical Results

AECOM

		PFAS Full Suite																																
		10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NEtFOSA	NEtFOSAA	NEtFOSE	NEtFOSE	NMeFOSA	NMeFOSAA	NMeFOSE	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (FOSA)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	Sum of PFAS	Sum of PFHxS and PFOS	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluorohexane sulfonic acid (PFHxS)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.05	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.02	0.05	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Drinking Water																													0.07			0.56		
PFAS NEMP 2020 Freshwater 99%																															0.00023	19		
Location	**Field ID**	**Date**	**Lab Report**	**Sample Type**																																
MW001	1200_MW001_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.15	**0.15**	**0.11**	<0.01	0.04
MW004	1200_MW004_230321	21/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.15	**0.15**	**0.09**	<0.01	0.06
MW004D	1200_MW004D_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012	1200_MW012_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW012D	1200_MW012D_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW018	1200_MW018_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021	1200_MW021_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW021D	1200_MW021D_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW023	1200_MW023_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW029	1200_MW029_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW029	1200_QC100_230322	22/03/2023	ES2310005	Intra-lab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW029	1200_QC200_230322	22/03/2023	RN1388287	Inter-lab Duplicate	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<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	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02*	<0.01	<0.01
MW030	1200_MW030_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.11	**0.11**	**0.08**	<0.01	0.03
MW031	1200_MW031_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.03	**0.03**	<0.01	<0.01
MW032	1200_MW032_230322	22/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.11	**0.09**	**0.07**	<0.01	0.02
MW032	1200_QC101_230322	22/03/2023	ES2310005	Intra-lab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.09	**0.07**	**0.05**	<0.01	0.02
MW032	1200_QC201_230322	22/03/2023	RN1388287	Inter-lab Duplicate	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	0.09	**0.07**	**0.06**	<0.01	0.019
MW034	1200_MW034_230321	21/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	0.04	<0.05	<0.02	<0.02	0.19	**0.1**	**0.08**	<0.01	0.02
MW066	1200_MW066_230321	21/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.02**	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	**0.03**	<0.02	<0.05	<0.02	<0.02	0.79	**0.65**	**0.52**	0.03	0.13
MW080	1200_MW080_230321	21/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	0.03	<0.05	<0.02	<0.02	0.07	0.02	**0.02**	<0.01	<0.01
MW112	1200_MW112_230323	23/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
MW113	1200_MW113_230323	23/03/2023	ES2310005	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<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	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01

Notes:
µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Denotes first time detection above LOR for Sum of PFHxS/PFOS or PFOA
Denotes new exceedance of human health screening criteria

Table T3
Surface Water Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

November - Surface Water Field Results

AECOM

Location ID	Sampled Date	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Temp (°C)	Clarity	Water Colour	Odour	Sheen	Observations of Water Body			Sample Method
												Flow Rate	Flow Direction	Stream Decription	
SW001	28/11/2022	1.51	77.0	50.1	6.90	77.7	32.6	High	Colourless	Odourless	No Sheen	Low Flow	South, flowing off-Base	-	Grab Sample
SW007	28/11/2022	2.16	54.7	32.8	6.15	103.3	29.7	High	Pale Yellow	Organic odour	No Sheen	-	South, flowing off-Base	-	Grab Sample
SW023	28/11/2022	2.81	62.5	37.5	6.97	75.8	27.3	High	Pale brown	Odourless	No Sheen	No Flow	No flow	Pooled Water	Grab Sample
SW028	28/11/2022	1.94	13.5	8.8	6.35	98.5	29.0	High	Colourless	Odourless	No Sheen	No Flow	South west	-	Grab Sample
SW059	24/11/2022	2.78	18.9	12.3	6.45	-123.3	-	Clear	Colourless	Odourless	No Sheen	No Flow	No Flow	Pooled Water	Grab Sample
SW075	24/11/2022	3.66	17.4	11.3	6.57	-119.1	-	Moderate	Pale brown	Odourless	No Sheen	Low Flow	East, flowing to CTA	-	Grab Sample
SW086	24/11/2022	3.24	44.2	28.7	5.84	83.4	30.1	High	Pale brown	Odourless	No Sheen	Low Flow	North	-	Grab Sample
SW091	24/11/2022	3.48	18.3	11.9	6.17	-105.7	30.1	High	Pale brown	Odourless	No Sheen	Mod Flow	North east	-	Grab Sample
SW123	24/11/2022	2.17	26.7	17.4	6.23	-119.6	29.7	High	Colourless	Organic odour	No Sheen	Low Flow	North east	-	Grab Sample

Notes:
-: Not collected
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table T4
Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Roberston Barracks Surrounds

November 2022 - Surface Water Analytical Results

AECOM

	PFAS Full Suite																																	
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (FOSA)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	Sum of PFAS	Sum of PFHxS and PFOS	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluorohexane sulfonic acid (PFHxS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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	0.05	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.02	0.05	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Freshwater 99%																													**0.00023**	**19**			
PFAS NEMP 2020 Recreational Water																												**2**		**10**			

Location Code	Date	Field ID	Lab Report	Sample Type																																
SW001	28/11/2022	1200_SW001_221128	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	**0.01**	**0.01**	**0.01**	<0.01	<0.01
SW007	28/11/2022	1200_SW007_221128	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW023	28/11/2022	1200_SW023_221128	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW028	28/11/2022	1200_SW028_221128	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW059	24/11/2022	1200_SW059_221124	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.03	**0.03**	<0.01	<0.01
SW059	24/11/2022	1200_QC100_221124	ES2242809	Intra-lab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.03	0.03	**0.03**	<0.01	<0.01
SW059	24/11/2022	1200_QC200_221124	RN1374780	Inter-lab Duplicate	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	0.03	0.03	**0.03**	<0.01	<0.01
SW075	24/11/2022	1200_SW075_221124	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	**0.01**	**0.01**	**0.01**	<0.01	<0.01
SW086	24/11/2022	1200_SW086_221124	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01*	<0.01	<0.01
SW091	24/11/2022	1200_SW091_221124	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	**0.06**	**0.06**	**0.05**	<0.01	**0.01**
SW123	24/11/2022	1200_SW123_221124	ES2242809	Primary	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	**0.02**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	0.28	0.25	**0.2**	**0.01**	0.05

µg/L: micrograms per litre
LOR: limit of reporting
* LOR is above guideline value
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedance of human health screening criteria

Table T5
Surface Water Field Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks

March - Surface Water Field Results

AECOM

Location ID	Sampled Date	DO (mg/L)	EC (µS/cm)	TDS (calc) (mg/L)	pH	Redox (mV)	Temp (°C)	Clarity	Water Colour	Odour	Sheen	Observations of Water Body			Sample Method
												Flow Rate	Flow Direction	Stream Decription	
SW001	23/03/2023	1.23	55.1	35.8	5.12	134.2	29.9	High	Colourless	Odourless	No Sheen	-	South, flowing off-Base	-	Grab Sample
SW007	22/03/2023	1.94	195.6	127.1	5.45	31.6	30.4	High	Colourless	Odourless	No Sheen	-	South, flowing off-Base	-	Grab Sample
SW023	21/03/2023	Dry - No parameters													
SW028	21/03/2023	Field parameters and observations missing - Data collection fault											South west		Grab Sample
SW059	21/03/2023	1.44	23.3	15.1	5.01	149.2	30.2	High	Colourless	Odourless	No Sheen	-	East, flowing off-Base to CTA	-	Grab Sample
SW075	21/03/2023	Field parameters and observations missing - Data collection fault											East, flowing to CTA	-	Grab Sample
SW086	22/03/2023	5.18	41.9	27.2	5.82	48.2	30.1	High	Colourless	Odourless	No Sheen	High Flow	North	-	Grab Sample
SW091	22/03/2023	5.62	44.3	28.8	6.09	38.4	30.1	High	Colourless	Odourless	No Sheen	High Flow	North east	-	Grab Sample
SW123	22/03/2023	4.94	34.8	22.6	5.93	44.5	29.7	High	Colourless	Odourless	No Sheen	High Flow	North east	-	Grab Sample

Notes:
-: Not collected
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees celcius

Table T6
Surface Water Analytical Results
PFAS Ongoing Monitoring Plan
Department of Defence - Robertson Barracks Surrounds

March 2023 - Surface Water Analytical Results

AECOM

Appendix C

Calibration Certificate

AECOM

Level 3, 9 Cavenagh Street
Darwin, Nt 0800

Water Quality Probe Calibration Sheet

Date	YSI #	Temp (°C)	pH 4		pH 7		DO (100%)		Electrical conductivity 1413 (µS/cm)		ORP		Initials
			Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	
~~28/11~~	24.11.23 #C	24.2	4.99	4.01	7.98	7.00	122%	108%	1422	—	254.2	@ 24.2	[redacted]
28/11	#C	26.3	4.02	—	7.00	—	102%	—	1500	1420	262.3	@ 26.3	

AECOM

Level 3, 9 Cavenagh Street
Darwin, Nt 0800

Water Quality Probe Calibration Sheet

Date	YSI #	Temp (°C)	pH 4		pH 7		DO (100%)		Electrical conductivity 1413 (µS/cm)		ORP		Initials
			Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	Pre-cal	Post-cal	
20/3	YSI # B	25.2	4.03	—	7.05	7.00	102	—	1410	—	231.2	—	[redacted]
22/3	YSI # B	28.2	4.10	4.00	7.15	7.02	105	—	1415	—	238.9	—	
23/3	#B	26.1	4.01	—	7.08	6.99	110	—	1458	1404	254.2	—	

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Equipment Information

Instrument: YSI ProPlus AECOM January 2023
Serial Number: Display 12D101138
Sonde 15K100390

Equipment Check YSI #B

	Enclosed	Returned	Comment
YSI Pro Plus Display	☑	☐	
YSI Quatro Sonde 4m	☑	☐	
- YSI 1001 pH Probe *(LN: 13L)*	☑	☐	
- YSI 1002 ORP Probe *(LN: 11G)*	☑	☐	
- YSI 5560 Cond/Temp Probe *(LN: 11G)*	☑	☐	
- YSI Polarographic DO Sensor *(LN: 13D)*	☑	☐	
Probe Guard	☑	☐	
Calibration Cup + cap	☑	☐	

New 4m Cable and EC/temp probe installed

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	☑	☐
Dissolved Oxygen	☑ 100% Saturation	±2%	☑	☐
	Pressure Compensation 1014 hPa		☑	☐
Conductivity	☑ 12.88mS/cm	±0.5%	☑	☐
	☐ Check linearity at 1.413mS/cm	±0.5%	☐	☐
Salinity	Auto Calibrated	±1%	☑	☐
pH	☑ pH 7.00	± 0.2	☑	☐
	☐ pH 4.00	± 0.2	☑	☐
ORP	☑ 242 mV at 21 °C	±20mV	☑	☐

New 4m Cable Installed

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards

[redacted]

31/1/23

Equipment Specialis
ECO Environmental

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

Tel: +61 8 9328 2900
fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au
214 Lord St Perth WA 6000

Equipment Information

Instrument: YSI ProPlus AECOM 121222
Serial Number: DISPLAY 17C103095; SONDE 18C100119 4M

YSI #C

Equipment Check

	Enclosed	Returned	Comment
YSI Pro Plus Display	☑	☐	
YSI Quatro Sonde	☑	☐	
- YSI 1001 pH Probe *(LN: 13L)*	☑	☐	
- YSI 1002 ORP Probe *(LN: 11G)*	☑	☐	
- YSI 5560 Cond/Temp Probe *(LN: 11G)*	☑	☐	
- YSI Polarographic DO Sensor *(LN: 13D)*	☐	☐	
Flow Cell & attachments	☑	☐	
Probe Guard	☑	☐	
Calibration Cup + cap	☑	☐	

Sensor Calibration Details

	Calibration Undertaken	Accuracy	Pass	Fail
Temperature	Factory Calibrated	±0.2°C	☑	☐
Dissolved Oxygen	☑ 100% Saturation	±2%	☑	☐
	Pressure Compensation	1014 hPa	☑	☐
Conductivity	☐ 12.88mS/cm	±0.5%	☐	☐
	☑ Check linearity at 1.413mS/cm	±0.5%	☑	☐
Salinity	Auto Calibrated	±1%	☑	☐
pH	☑ pH 7.00	± 0.2	☑	☐
	☑ pH 4.00	± 0.2	☑	☐
ORP	☑ 242 mV at 21 °C	±20mV	☑	☐

New pH sensor & battery cover installed.

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards

[redacted]

1/11/23

Equipment Specialist
ECO Environmental

Appendix D

Data Validation Report

AECOM

DATA VALIDATION REPORT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	26/04/2023
Site:	1200 - Robertson Barracks & Surrounds		
Matrix:	Water	**Data Verified by:**	[redacted]
Laboratory:	ALS and NMI Sydney	**Date:**	28/04/2023
Lab reference:	ES2242809, RN1374780, ES2310005, RN1388287		

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			
Number of tests requested/reported		✓			
Sample handling/preservation/holding times			✓	1	No
Frequency of laboratory QA/QC			✓	2	No
Limits of reporting (LOR)			✓	3	No
Blank analysis	Field blank	✓			No
	Rinsate blank		✓	4	No
	Trip blank	✓			No
	Method blank	✓			No
Field intra-laboratory relative percent differences (RPDs)		✓			No
Field inter-laboratory RPDs		✓			No
Laboratory duplicate RPDs		✓			No
Matrix spike (MS) % recoveries		✓			No
Laboratory control spike (LCS) % recoveries		✓			No
Surrogate % recoveries		✓			No
Other observations		✓			N/A

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Comments	
1. Sample handling/preservation/ holding times	**Handling/preservation** Sample receipt temperatures were outside of the recommended range (≤6°C) in all laboratory batches as shown below: <table><tr><th>Event</th><th>Batch Number</th><th>Temperature</th></tr><tr><td>November 2022</td><td>ES2242809</td><td>10.6°C</td></tr><tr><td></td><td>RN1374780</td><td>Chilled</td></tr><tr><td>March 2023</td><td>ES2310005</td><td>17.2°C</td></tr><tr><td></td><td>RN1388287</td><td>Chilled</td></tr></table> The sample receipt temperatures were not recorded for the NMI inter-laboratory duplicate samples; however the samples were noted to be chilled. However, as the receipt temperatures were well below the ambient water temperatures at the time of sampling (~30ºC) and the samples were immediately cooled upon collection, this is not considered to significantly impact the interpretation of PFAS concentrations.
2. Frequency of laboratory QA/QC	Laboratory duplicate samples were not reported at the required frequencies for PFAS analytes in the primary batch ES2242809. The precision of the data can be assessed as acceptable based on intra- and inter-laboratory duplicate RPDs which were reported at the required frequencies and within control limits. Matrix spikes were not reported at the required frequencies for PFAS analytes in batch ES2242809. The accuracy of the data can be assessed as acceptable based on method blanks, LCS and surrogate spike recoveries (which were reported at the required frequencies and within control limits).
3. Limits of reporting (LOR)	Limits of reporting were sufficiently low to enable assessment against adopted guideline criteria, with the exception of PFOS in laboratory batches ES2242809 and ES2310005. The potential exists for concentrations of PFOS to be below the LOR but above the 99% ecosystem protection guideline in samples and should be taken into consideration when interpreting results.
4. Rinsate blank	During the March 2023 sampling event, a total of three rinsates were obtained from a decontaminated interface probe with the exception of the rinsate for the 22 March 2023 sampling day, the rinse sample was inadvertently collected from the probe prior to instead of following decontamination. Even though there are two rinsates instead of three, the decontamination methods are assessed as acceptable and the potential for cross-contamination via sampling methods is considered unlikely base on the following: • Sampling equipment was either dedicated, disposable or decontaminated with Liquinox between sample locations • Concentrations of all analytes were reported below the LOR in the two rinsate samples collected properly

Field QA/QC - November 2022
PFAS Ongoing Monitoring Plan
Department of Defence - Roberston Barracks Surrounds

Field QA/QC

Lab Report Number	ES2242809	ES2242809	ES2242809	ES2242809	ES2242809
Field ID	1200_QC400_221124	1200_QC401_221128	1200_QC300_221124	1200_QC301_221128	1200_QC500_221124
Sampled Date	24/11/2022	28/11/2022	24/11/2022	28/11/2022	24/11/2022
Sample Type	Field Blank	Field Blank	Rinsate	Rinsate	Trip Blank

Analyte	Units	LOR					
PFAS Full Suite							
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Field QA/QC

Lab Report Number	ES2310005	ES2310005	ES2310005	ES2310005	ES2310005	ES2310005	ES2310005	ES2310005
Field ID	1200_QC400_230321	1200_QC400_230322	1200_QC401_230323	1200_QC300_230321	1200_QC300_230322	1200_QC301_230323	1200_QC500_230321	1200_QC500_230322
Sampled Date	21/03/2023	22/03/2023	23/03/2023	21/03/2023	22/03/2023	23/03/2023	21/03/2023	22/03/2023
Sample Type	Field Blank	Field Blank	Field Blank	Rinsate	Rinsate	Rinsate	Trip Blank	Trip Blank

Analyte	Units	LOR								
PFAS Full Suite										
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	**0.04**	<0.02	<0.02	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	**0.14**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	**0.08**	<0.01	<0.01	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	<0.01	<0.01
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	<0.01	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	**0.07**	<0.01	<0.01	<0.01

Field RPDs - November 2022
PFAS Ongoing Monitoring Plan
Department of Defence - Roberston Barracks Surrounds

Relative Percentage Differences

Lab Report Number	ES2242809	ES2242809		ES2242809	RN1374780	
Field ID	1200_SW059_221124	1200_QC100_221124	RPD	1200_SW059_221124	1200_QC200_221124	RPD
Sampled Date	24/11/2022	24/11/2022		24/11/2022	24/11/2022	
Sample Type	Primary	Intra-lab Duplicate		Primary	Inter-lab Duplicate	

Analyte	Units	LOR						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	0.03	0.03	0	0.03	0.026	14
Sum of PFHxS and PFOS	µg/L	0.01	0.03	0.03	0	0.03	0.026	14
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01 : 0.02 (Interlab)	0.03	0.03	0	0.03	0.026	14
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0

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

Field RPDs - March 2023
PFAS Ongoing Monitoring Plan
Department of Defence - Roberston Barracks and Surrounds

Relative percentage Differences

Lab Report Number		**ES2310005**	**ES2310005**		**ES2310005**	**RN1388287**		**ES2310005**	**ES2310005**		**ES2310005**	**RN1388287**	
Field ID		1200_MW029_230322	1200_QC100_230322	**RPD**	1200_MW029_230322	1200_QC200_230322	**RPD**	1200_MW032_230322	1200_QC101_230322	**RPD**	1200_MW032_230322	1200_QC201_230322	**RPD**
Sampled Date		22/03/2023	22/03/2023		22/03/2023	22/03/2023		22/03/2023	22/03/2023		22/03/2023	22/03/2023	
Sample Type		Primary	Intra-lab Duplicate		Primary	Inter-lab Duplicate		Primary	Intra-lab Duplicate		Primary	Inter-lab Duplicate	
Analyte	**Units**	**LOR**											
PFAS Full Suite													
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	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
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	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
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<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	0.02 : 0.01 (Interlab)	<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	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<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	0.02 : 0.01 (Interlab)	<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	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	0.02	0	<0.02	0.014	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.01 (Interlab)	<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	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	0.02	<0.02	0	0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0	<0.05	<0.05	0	<0.05	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	0.11	0.09	20	0.11	0.079	33
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	0.09	0.07	25	0.09	0.079	13
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0	0.07	0.05	33	0.07	0.06	15
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
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	0.02	0.02	0	0.02	0.019	5

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

Field RPDs - March 2023
PFAS Ongoing Monitoring Plan
Department of Defence - Roberston Barracks and Surrounds

Relative percentage Differences

Lab Report Number		**ES2310005**	**ES2310005**		**ES2310005**	**RN1388287**	
Field ID		1200_SW028_230321	1200_QC110_230321	**RPD**	1200_SW028_230321	1200_QC210_230321	**RPD**
Sampled Date		21/03/2023	21/03/2023		21/03/2023	21/03/2023	
Sample Type		Primary	Intra-lab Duplicate		Primary	Inter-lab Duplicate	
Analyte	**Units**	**LOR**					
PFAS Full Suite							
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02 : 0.01 (Intertab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05 : 0.02 (Intertab)	<0.05	<0.05	0	<0.05	<0.02	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0

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

Laboratory Certificates

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2242809**	Page	: 1 of 6
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	[redacted]	Telephone	[redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 29-Nov-2022
Site	: ---	Issue Date	: 26-Jun-2023
Sampler	[redacted]	No. of samples received	: 15
Order number	: 60612561/2.1	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.**
- **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

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

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	36	5.56	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	36	2.78	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
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 1200_SW086_221124, 1200_SW091_221124, 1200_SW123_221124, 1200_SW059_221124, 1200_SW075_221124, 1200_QC100_221124, 1200_QC300_221124, 1200_QC400_221124, 1200_QC500_221124	**24-Nov-2022**	**30-Nov-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 1200_SW028_221128	**28-Nov-2022**	**02-Dec-2022**	27-May-2023	✓	**06-Dec-2022**	27-May-2023	✓
HDPE (no PTFE) (EP231X) 1200_SW023_221128, 1200_SW007_221128, 1200_SW001_221128, 1200_QC301_221128, 1200_QC401_221128	**28-Nov-2022**	**30-Nov-2022**	27-May-2023	✓	**07-Dec-2022**	27-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)							
1200_SW086_221124, 1200_SW091_221124, 1200_SW123_221124, 1200_SW059_221124, 1200_SW075_221124, 1200_QC100_221124, 1200_QC300_221124, 1200_QC400_221124, 1200_QC500_221124	**24-Nov-2022**	**30-Nov-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X)							
1200_SW028_221128	**28-Nov-2022**	**02-Dec-2022**	27-May-2023	✓	**06-Dec-2022**	27-May-2023	✓
HDPE (no PTFE) (EP231X)							
1200_SW023_221128, 1200_SW007_221128, 1200_SW001_221128, 1200_QC301_221128, 1200_QC401_221128	**28-Nov-2022**	**30-Nov-2022**	27-May-2023	✓	**07-Dec-2022**	27-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
1200_SW086_221124, 1200_SW091_221124, 1200_SW123_221124, 1200_SW059_221124, 1200_SW075_221124, 1200_QC100_221124, 1200_QC300_221124, 1200_QC400_221124, 1200_QC500_221124	**24-Nov-2022**	**30-Nov-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X)							
1200_SW028_221128	**28-Nov-2022**	**02-Dec-2022**	27-May-2023	✓	**06-Dec-2022**	27-May-2023	✓
HDPE (no PTFE) (EP231X)							
1200_SW023_221128, 1200_SW007_221128, 1200_SW001_221128, 1200_QC301_221128, 1200_QC401_221128	**28-Nov-2022**	**30-Nov-2022**	27-May-2023	✓	**07-Dec-2022**	27-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW086_221124, 1200_SW091_221124, 1200_SW123_221124, 1200_SW059_221124, 1200_SW075_221124, 1200_QC100_221124, 1200_QC300_221124, 1200_QC400_221124, 1200_QC500_221124	**24-Nov-2022**	**30-Nov-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X)							
1200_SW028_221128	**28-Nov-2022**	**02-Dec-2022**	27-May-2023	✓	**06-Dec-2022**	27-May-2023	✓
HDPE (no PTFE) (EP231X)							
1200_SW023_221128, 1200_SW007_221128, 1200_SW001_221128, 1200_QC301_221128, 1200_QC401_221128	**28-Nov-2022**	**30-Nov-2022**	27-May-2023	✓	**07-Dec-2022**	27-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) 1200_SW086_221124, 1200_SW091_221124, 1200_SW123_221124, 1200_SW059_221124, 1200_SW075_221124, 1200_QC100_221124, 1200_QC300_221124, 1200_QC400_221124, 1200_QC500_221124	**24-Nov-2022**	**30-Nov-2022**	23-May-2023	✓	**07-Dec-2022**	23-May-2023	✓
HDPE (no PTFE) (EP231X) 1200_SW028_221128	**28-Nov-2022**	**02-Dec-2022**	27-May-2023	✓	**06-Dec-2022**	27-May-2023	✓
HDPE (no PTFE) (EP231X) 1200_SW023_221128, 1200_SW007_221128, 1200_SW001_221128, 1200_QC301_221128, 1200_QC401_221128	**28-Nov-2022**	**30-Nov-2022**	27-May-2023	✓	**07-Dec-2022**	27-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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	36	**2.78**	**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
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.

QUALITY CONTROL REPORT

Work Order	: **ES2242809**	Page	: 1 of 8
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 29-Nov-2022
Order number	: 60612561/2.1	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: —	Issue Date	: 26-Jun-2023
Sampler	: [redacted]		
Site	: —		
Quote number	: SY/139/19 V3		
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*
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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4736242)									
ES2242809-003	1200_SW123_221124	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.05	0.06	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.20	0.18	9.1	0% - 50%
		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
ES2242809-011	1200_SW007_221128	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: 4736242)									
ES2242809-003	1200_SW123_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

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: 4736242) - continued									
ES2242809-011	1200_SW007_221128	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: 4736242)									
ES2242809-003	1200_SW123_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
ES2242809-011	1200_SW007_221128	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: 4736242)									
ES2242809-003	1200_SW123_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

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: 4736242) - continued									
ES2242809-003	1200_SW123_221124	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
ES2242809-011	1200_SW007_221128	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: 4736242)									
ES2242809-003	1200_SW123_221124	EP231X: Sum of PFAS	---	0.01	µg/L	0.28	0.27	3.6	0% - 20%
ES2242809-011	1200_SW007_221128	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4736242)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	80.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	91.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	97.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743860)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	77.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	78.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	93.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	96.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4736242)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	87.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	110	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	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	128	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743860)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	91.0	72.0	130

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: 4743860) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	90.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	95.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	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	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4736242)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	84.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	114	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	99.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	110	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	95.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743860)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	92.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	113	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	92.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	88.2	57.6	145
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	111	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4736242)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.6	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	88.0	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	83.4	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	124	71.4	144

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: 4743860)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	90.2	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	77.8	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	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	80.8	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4736242)							
ES2242809-010	1200_SW023_221128	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	109	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	106	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	121	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	118	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4736242)							
ES2242809-010	1200_SW023_221128	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	105	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	99.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	121	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	110	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	118	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	129	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	129	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	124	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	113	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	116	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	124	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4736242)							
ES2242809-010	1200_SW023_221128	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	97.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	117	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	124	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	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: 4736242) - continued							
ES2242809-010	1200_SW023_221128	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	125	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	108	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4736242)							
ES2242809-010	1200_SW023_221128	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	107	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	101	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	125	71.4	144

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS: ◉ Standard TAT (List due date):
OFFICE:	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):
PROJECT: NT_~~0000~~-PFASOMP	ALS QUOTE NO.: SY/139/19 V3
ORDER NUMBER: 60612561 / ~~0000~~ 2.1	COC SEQUENCE NUMBER (Circle): COC: 1 2 3 4 5 6 7; SOF: 1 2 3 4 5 6 7
PROJECT MANAGER: James Guzman	CONTACT PH: 0499333601
SAMPLER: WR/SF/PH	SAMPLER MOBILE: 0466297464
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): james.guzman@aecom.com; poppy.harding1@aecom.com; mat.jenkins@aecom.com; derp.labreports@esdat.com;	
Email Invoice to (will default to PM if no other addresses are listed): ap_customerservice.anz@aecom.com	

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice blocks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

RELINQUISHED BY:	RECEIVED BY:	RELIN	RECEIVED BY:
AECOM SH	[redacted]	[redacted]	[redacted]
DATE/TIME: 28-11-22 13:59	DATE/TIME: 28/11 2:00pm	DATE/TIME: 28/11 2:00pm	DATE/TIME: 29/11/22 0830

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Forward QC200s to NMI Sydney

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).			Additional Information
LAB ID	Sample ID: ~~0000~~_MWXXX_220XXX	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	1200_SW086_221124	24.11.22 10:15	W	2x PFAS	2	X			
2	1200_SW091_221124	10:53			2	X			
3	1200_SW123_221124	11:15			2	X			
4	1200_SW059_221124	13:53			2	X			
5	1200_SW075_221124	14:37			2	X			
6	1200_QC100_221124	—			2	X			
7	1200_QC200_221124	—			2	X			SEND TO NMI for analysis
8	1200_QC300_221124	—			2	X			
9	1200_QC400_221124	—			2	X			
10	1200_QC500_221124	—	↓	1x PFAS	1	X			

Environmental Division
Sydney
Work Order Reference
ES2242809

Telephone : + 61-2-8784 8555

LAB OF ORIGIN: DARWIN

Submitted WO: NMI
Organised By / Date: QC200
Relinquished By / Date:
Consolo / Courier: QC Forward
WO Number: ES2242802
Attach By PO / Internal Sheet:

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: AECOM	TURNAROUND REQUIREMENTS : ◉ Standard TAT (List due date): (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):
OFFICE: ~~[illegible]~~	
PROJECT: NT_~~0990~~_PFASOMP	ALS QUOTE NO.: SY/139/19 V3
ORDER NUMBER: 60612561 / 3.1	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
PROJECT MANAGER: James Guzman	CONTACT PH: 0499333601
SAMPLER: WR/SF/PH	SAMPLER MOBILE: 0466287464
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): james.guzman@aecom.com; poppy.harding1@aecom.com; mat.jenkins@aecom.com; derp.labreports@esdat.com;	
Email Invoice to (will default to PM if no other addresses are listed): ap_customerservice.anz@aecom.com	

FOR LABORATORY USE ONLY (Circle)

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

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

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Forward QC2/6s to NMI Sydney

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	Sample ID: 0990_MWXXX_220XXX	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - EP231X								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
10	1200_SW023_221128	28.11.22 11:36	W	2x PFAS	2	X								
11	1200_SW007_221128	↑ 12:13	W	2x PFAS	2	X								
12	1200_SW001_221128	— 12:49	W	2x PFAS	2	X								
13	1200_QC301_221128	28.11.22	W	2x PFAS	2	X								
14	1200_QC401_221128	28.11.22	W	2x PFAS	2	X								
15	1200_SW070_221128													
				TOTAL										

LAB OF ORIGIN. DARWIN

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2242809**		
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PY LTD**	Laboratory	[redacted]
Contact	: [redacted]	Contact	
Address	: DARWIN NT, AUSTRALIA 0801	Address	
E-mail	: [redacted]	E-mail	
Telephone	: ---	Telephone	
Facsimile	: ---	Facsimile	
Project	: NT_1200_PFASOMP	Page	: 1 of 3
Order number	: 60612561/2.1	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: [redacted]		

Dates

Date Samples Received	: 29-Nov-2022 08:30	Issue Date	: 26-Jun-2023
Client Requested Due Date	: 06-Dec-2022	Scheduled Reporting Date	: **06-Dec-2022**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 10.6 'C SYD - 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
- This is an updated SRN to correct the sample ID for sample #15 as per [redacted] on the 26/6/23.
- **Sample 1200_QC200_221124 forwarded to NMI for analysis.**
- **(02/12/2022) This is an updated SRN which reflects the addition of EP231X analysis to sample 015.**
- **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 direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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)
ES2242809-001	24-Nov-2022 00:00	1200_SW086_221124	✓
ES2242809-002	24-Nov-2022 00:00	1200_SW091_221124	✓
ES2242809-003	24-Nov-2022 00:00	1200_SW123_221124	✓
ES2242809-004	24-Nov-2022 00:00	1200_SW059_221124	✓
ES2242809-005	24-Nov-2022 00:00	1200_SW075_221124	✓
ES2242809-006	24-Nov-2022 00:00	1200_QC100_221124	✓
ES2242809-007	24-Nov-2022 00:00	1200_QC300_221124	✓
ES2242809-008	24-Nov-2022 00:00	1200_QC400_221124	✓
ES2242809-009	24-Nov-2022 00:00	1200_QC500_221124	✓
ES2242809-010	28-Nov-2022 00:00	1200_SW023_221128	✓
ES2242809-011	28-Nov-2022 00:00	1200_SW007_221128	✓
ES2242809-012	28-Nov-2022 00:00	1200_SW001_221128	✓
ES2242809-013	28-Nov-2022 00:00	1200_QC301_221128	✓
ES2242809-014	28-Nov-2022 00:00	1200_QC401_221128	✓
ES2242809-015	28-Nov-2022 00:00	1200_SW028_221128	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV) Email

DERP ESDAT REPORTS

- EDI Format - ESDAT (ESDAT) Email

[redacted]

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

[redacted]

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

[redacted]

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

[redacted]

CERTIFICATE OF ANALYSIS

Work Order	: **ES2242809**	Page	: 1 of 9
Amendment	: **1**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	[redacted]
Contact	[redacted]	Contact	
Address		Address	
Telephone	: —	Telephone	
Project	: NT_1200_PFASOMP	Date Samples Received	: 29-Nov-2022 08:30
Order number	: 60612561/2.1	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: —	Issue Date	: 26-Jun-2023 17:29
Sampler	[redacted]		
Site	: —		
Quote number	: SY/139/19 V3		
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*
[redacted]	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.

- 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.
- Amendment (26/06/2023): This report has been amended as a result of a request to change sample identification numbers (IDs) received from [redacted] on 26/06/2023 for samples #15. All analysis results are as per the previous report.
- 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: WATER (Matrix: WATER)				Sample ID	1200_SW086_221124	1200_SW091_221124	1200_SW123_221124	1200_SW059_221124	1200_SW075_221124
				Sampling date / time	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00
Compound	CAS Number	LOR	Unit		ES2242809-001	ES2242809-002	ES2242809-003	ES2242809-004	ES2242809-005
					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**	**0.05**	<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	**0.05**	**0.20**	**0.03**	**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: WATER (Matrix: WATER)				Sample ID	1200_SW086_221124	1200_SW091_221124	1200_SW123_221124	1200_SW059_221124	1200_SW075_221124
				Sampling date / time	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00
Compound	CAS Number	LOR	Unit		ES2242809-001	ES2242809-002	ES2242809-003	ES2242809-004	ES2242809-005
					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	**0.06**	**0.28**	**0.03**	**0.01**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.06**	**0.25**	**0.03**	**0.01**
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.06**	**0.28**	**0.03**	**0.01**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**96.1**	**102**	**102**	**95.1**	**102**
13C8-PFOA	---	0.02	%		**108**	**109**	**108**	**108**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC100_221124	1200_QC300_221124	1200_QC400_221124	1200_QC500_221124	1200_SW023_221128
				Sampling date / time	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	28-Nov-2022 00:00
Compound	CAS Number	LOR	Unit		ES2242809-006	ES2242809-007	ES2242809-008	ES2242809-009	ES2242809-010
					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		**0.03**	<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: WATER (Matrix: WATER)				Sample ID	1200_QC100_221124	1200_QC300_221124	1200_QC400_221124	1200_QC500_221124	1200_SW023_221128
				Sampling date / time	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	24-Nov-2022 00:00	28-Nov-2022 00:00
Compound	CAS Number	LOR	Unit		ES2242809-006	ES2242809-007	ES2242809-008	ES2242809-009	ES2242809-010
					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		**0.03**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.03**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**93.1**	**97.3**	**94.5**	**95.6**	**101**
13C8-PFOA	---	0.02	%		**107**	**109**	**111**	**99.4**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_SW007_221128	1200_SW001_221128	1200_QC301_221128	1200_QC401_221128	1200_SW028_221128
				Sampling date / time	28-Nov-2022 00:00	28-Nov-2022 00:00	28-Nov-2022 00:00	28-Nov-2022 00:00	28-Nov-2022 00:00
Compound	CAS Number	LOR	Unit		ES2242809-011	ES2242809-012	ES2242809-013	ES2242809-014	ES2242809-015
					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: WATER (Matrix: WATER)				Sample ID	1200_SW007_221128	1200_SW001_221128	1200_QC301_221128	1200_QC401_221128	1200_SW028_221128
				Sampling date / time	28-Nov-2022 00:00	28-Nov-2022 00:00	28-Nov-2022 00:00	28-Nov-2022 00:00	28-Nov-2022 00:00
Compound	CAS Number	LOR	Unit		ES2242809-011	ES2242809-012	ES2242809-013	ES2242809-014	ES2242809-015
					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**	**111**	**103**	**94.5**	**105**
13C8-PFOA	---	0.02	%		**108**	**99.2**	**105**	**103**	**92.2**

Surrogate Control Limits

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

Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA

REPORT OF ANALYSIS

Report No. RN1374780

Client	: AECOM AUSTRALIA PTY LTD	**Job No.**	: AECO06/221129
	[redacted]	**Quote No.**	: QT-02018
	[redacted]	**Order No.**	: [redacted]
		Date Received	: 29-NOV-2022
Attention	: J[redacted]	**Sampled By**	: CLIENT
Project Name	: NT_1200_PFASOMP		
Your Client Services Manager	: [redacted]	**Phone**	: [redacted]

Lab Reg No.	Sample Ref	Sample Description
N22/024107	1200_QC200_221124	WATER 24.11.22 14:37

Lab Reg No.		N22/024107				
Date Sampled		24-NOV-2002				
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05				NR70
PFPeA (2706-90-3)	ug/L	<0.02				NR70
PFHxA (307-24-4)	ug/L	<0.01				NR70
PFHpA (375-85-9)	ug/L	<0.01				NR70
PFOA (335-67-1)	ug/L	<0.01				NR70
PFNA (375-95-1)	ug/L	<0.01				NR70
PFDA (335-76-2)	ug/L	<0.01				NR70
PFUdA (2058-94-8)	ug/L	<0.01				NR70
PFDoA (307-55-1)	ug/L	<0.01				NR70
PFTrDA (72629-94-8)	ug/L	<0.02				NR70
PFTeDA (376-06-7)	ug/L	<0.02				NR70
PFHxDA (67905-19-5)	ug/L	<0.02				NR70
PFODA (16517-11-6)	ug/L	<0.05				NR70
FOUEA (70887-84-2)	ug/L	<0.01				NR70
PFDS (335-77-3)	ug/L	<0.01				NR70
PFPeS (2706-91-4)	ug/L	<0.01				NR70
PFHxS (355-46-4)	ug/L	<0.01				NR70
PFHpS (375-92-8)	ug/L	<0.01				NR70
PFOS (1763-23-1)	ug/L	0.026				NR70
PFNS (68259-12-1)	ug/L	<0.01				NR70
PFBS (375-73-5)	ug/L	<0.01				NR70
PFOSA (754-91-6)	ug/L	<0.01				NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02				NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02				NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01				NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01				NR70
N-MeFOSE (24448-09-7)	ug/L	<0.05				NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05				NR70
4:2 FTS (757124-72-4)	ug/L	<0.01				NR70
6:2 FTS (27619-97-2)	ug/L	<0.01				NR70

REPORT OF ANALYSIS

Report No. RN1374780

Lab Reg No.		N22/024107				
Date Sampled		24-NOV-2002				
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
8:2 FTS (39108-34-4)	ug/L	<0.01				NR70
10:2 FTS (120226-60-0)	ug/L	<0.01				NR70
8:2 diPAP (678-41-1)	ug/L	<0.02				NR70
PFBA (Surrogate Recovery)	%	94				NR70
PFPeA (Surrogate Recovery)	%	96				NR70
PFHxA (Surrogate Recovery)	%	94				NR70
PFHpA (Surrogate Recovery)	%	90				NR70
PFOA (Surrogate Recovery)	%	95				NR70
PFNA (Surrogate Recovery)	%	97				NR70
PFDA (Surrogate Recovery)	%	98				NR70
PFUdA (Surrogate Recovery)	%	97				NR70
PFDoA (Surrogate Recovery)	%	89				NR70
PFTeDA (Surrogate Recovery)	%	91				NR70
PFHxDA (Surrogate Recovery)	%	92				NR70
FOUEA (Surrogate Recovery)	%	70				NR70
PFBS (Surrogate Recovery)	%	100				NR70
PFHxS (Surrogate Recovery)	%	86				NR70
PFOS (Surrogate Recovery)	%	95				NR70
PFOSA (Surrogate Recovery)	%	76				NR70
N-MeFOSA (Surrogate Recovery)	%	51				NR70
N-EtFOSA (Surrogate Recovery)	%	50				NR70
N-MeFOSAA (Surrogate Recovery)	%	87				NR70
N-EtFOSAA (Surrogate Recovery)	%	84				NR70
N-MeFOSE (Surrogate Recovery)	%	60				NR70
N-EtFOSE (Surrogate Recovery)	%	61				NR70
4:2 FTS (Surrogate Recovery)	%	92				NR70
6:2 FTS (Surrogate Recovery)	%	80				NR70
8:2 FTS (Surrogate Recovery)	%	74				NR70
8:2 diPAP (Surrogate Recovery)	%	77				NR70
Dates						
Date extracted		2-DEC-2022				
Date analysed		2-DEC-2022				

N22/024107

PFOS and PFHxS are quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.

All results corrected for labelled surrogate recoveries.

REPORT OF ANALYSIS

Report No. RN1374780

Lab Reg No.		N22/024107				
Date Sampled		24-NOV-2002				
	Units					Method

[redacted]

[redacted]

06-DEC-2022

NATA
WORLD RECOGNISED
ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) as received and tested.

This Report supersedes reports: *RN1374768*

Measurement Uncertainty is available upon request.

Note: Sampling date(s) have been provided by the client.
Chemical Accreditation 198: [redacted]

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/221129 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.05	<0.05	NA	NA	NA	114	NA
PFPeA (2706-90-3)	NR70	0.02	<0.02	NA	NA	NA	113	NA
PFHxA (307-24-4)	NR70	0.01	<0.01	NA	NA	NA	111	NA
PFHpA (375-85-9)	NR70	0.01	<0.01	NA	NA	NA	112	NA
PFOA (335-67-1)	NR70	0.01	<0.01	NA	NA	NA	108	NA
PFNA (375-95-1)	NR70	0.01	<0.01	NA	NA	NA	112	NA
PFDA (335-76-2)	NR70	0.01	<0.01	NA	NA	NA	110	NA
PFUdA (2058-94-8)	NR70	0.01	<0.01	NA	NA	NA	110	NA
PFDoA (307-55-1)	NR70	0.01	<0.01	NA	NA	NA	106	NA
PFTrDA (72629-94-8)	NR70	0.02	<0.02	NA	NA	NA	109	NA
PFTeDA (376-06-7)	NR70	0.02	<0.02	NA	NA	NA	114	NA
PFHxDA (67905-19-5)	NR70	0.02	<0.02	NA	NA	NA	110	NA
PFODA (16517-11-6)	NR70	0.05	<0.05	NA	NA	NA	106	NA
FOUEA (70887-84-2)	NR70	0.01	<0.01	NA	NA	NA	107	NA
PFBS (375-73-5)	NR70	0.01	<0.01	NA	NA	NA	107	NA
PFPeS (2706-91-4)	NR70	0.01	<0.01	NA	NA	NA	110	NA
PFHxS (355-46-4)	NR70	0.01	<0.01	NA	NA	NA	111	NA
PFHpS (375-92-8)	NR70	0.01	<0.01	NA	NA	NA	118	NA
PFOS (1763-23-1)	NR70	0.02	<0.02	NA	NA	NA	106	NA
PFNS (68259-12-1)	NR70	0.01	<0.01	NA	NA	NA	105	NA
PFDS (335-77-3)	NR70	0.01	<0.01	NA	NA	NA	110	NA
PFOSA (754-91-6)	NR70	0.01	<0.01	NA	NA	NA	109	NA
N-MeFOSA (31506-32-8)	NR70	0.02	<0.02	NA	NA	NA	109	NA
N-EtFOSA (4151-50-2)	NR70	0.02	<0.02	NA	NA	NA	109	NA
N-MeFOSAA (2355-31-9)	NR70	0.01	<0.01	NA	NA	NA	110	NA
N-EtFOSAA(2991-50-6)	NR70	0.01	<0.01	NA	NA	NA	109	NA
N-MeFOSE (24448-09-7)	NR70	0.05	<0.05	NA	NA	NA	109	NA
N-EtFOSE (1691-99-2)	NR70	0.05	<0.05	NA	NA	NA	107	NA
4:2 FTS (757124-72-4)	NR70	0.01	<0.01	NA	NA	NA	118	NA
6:2 FTS (27619-97-2)	NR70	0.01	<0.01	NA	NA	NA	106	NA
8:2 FTS (39108-34-4)	NR70	0.01	<0.01	NA	NA	NA	118	NA
10:2 FTS (120226-60-0)	NR70	0.01	<0.01	NA	NA	NA	113	NA
8:2 diPAP (678-41-1)	NR70	0.02	<0.02	NA	NA	NA	110	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed: [redacted]

Date: 5

[redacted]

National Measurement Institute

QUALITY CONTROL REPORT

Work Order	: **ES2310005**	Page	: 1 of 11
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	[redacted]		[redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP_23	Date Samples Received	: 28-Mar-2023
Order number	: [redacted]	Date Analysis Commenced	: 28-Mar-2023
C-O-C number	: —	Issue Date	: 03-Apr-2023
Sampler	: [redacted]		
Site	: —		
Quote number	: EN/004/21		
No. of samples received	: 37		
No. of samples analysed	: 37		

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*
[redacted]	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4959057)									
ES2310005-015	1200_SW007_230322	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.02	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.04	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
ES2310005-019	1200_SW028_230321	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: 4959063)									
ES2310005-021	1200_MW112_230323	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
ES2310005-022	1200_MW113_230323	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

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: 4959063) - continued									
ES2310005-022	1200_MW113_230323	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: 4959057)									
ES2310005-015	1200_SW007_230322	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
ES2310005-019	1200_SW028_230321	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: 4959063)									
ES2310005-021	1200_MW112_230323	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
ES2310005-022	1200_MW113_230323	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

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: 4959063) - continued									
ES2310005-022	1200_MW113_230323	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: 4959057)									
ES2310005-015	1200_SW007_230322	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
ES2310005-019	1200_SW028_230321	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: 4959063)									
ES2310005-021	1200_MW112_230323	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: 4959063) - continued									
ES2310005-021	1200_MW112_230323	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
ES2310005-022	1200_MW113_230323	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: 4959057)									
ES2310005-015	1200_SW007_230322	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
ES2310005-019	1200_SW028_230321	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: 4959063)									
ES2310005-021	1200_MW112_230323	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	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: 4959063) - continued									
ES2310005-021	1200_MW112_230323	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
ES2310005-022	1200_MW113_230323	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: 4959057)									
ES2310005-015	1200_SW007_230322	EP231X: Sum of PFAS	---	0.01	µg/L	0.06	0.05	18.2	No Limit
ES2310005-019	1200_SW028_230321	EP231X: Sum of PFAS	---	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4959063)									
ES2310005-021	1200_MW112_230323	EP231X: Sum of PFAS	---	0.01	µg/L	<0.01	<0.01	0.0	No Limit
ES2310005-022	1200_MW113_230323	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4959057)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	98.6	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	94.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	122	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	105	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	94.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4959063)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	80.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	77.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	78.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	76.7	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	84.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4959057)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	114	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	116	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	113	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	123	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	122	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	122	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4959063)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	94.8	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	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.0	72.0	130

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: 4959063) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	84.7	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	75.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	73.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	100	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	82.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	89.3	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4959057)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	111	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	126	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	111	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	119	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	116	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	117	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	127	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4959063)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.5	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	103	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	103	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	90.3	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	90.1	57.6	145
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	109	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4959057)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.8	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	117	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	123	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	96.6	71.4	144

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4959063)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	115	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	92.4	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	114	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	113	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4959057)							
ES2310005-015	1200_SW007_230322	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	114	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	95.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	128	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	113	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4959063)							
ES2310005-021	1200_MW112_230323	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	91.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	85.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	78.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	83.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	76.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.7	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4959057)							
ES2310005-015	1200_SW007_230322	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	114	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	111	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	114	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	118	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	111	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	113	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	118	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	111	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	122	71.0	132

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: 4959063)							
ES2310005-021	1200_MW112_230323	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	93.9	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	90.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	86.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	77.1	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	80.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	110	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	120	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	99.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	82.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4959057)							
ES2310005-015	1200_SW007_230322	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	92.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	121	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	108	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	123	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	113	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	118	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	124	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4959063)							
ES2310005-021	1200_MW112_230323	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	87.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	100	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	91.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	81.6	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	79.6	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	96.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4959057)							
ES2310005-015	1200_SW007_230322	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	103	63.0	143

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: 4959057) - continued							
ES2310005-015	1200_SW007_230322	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	124	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	102	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4959063)							
ES2310005-021	1200_MW112_230323	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	101	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	95.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	87.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	114	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2310005**	Page	: 1 of 8
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]		
Project	: NT_1200_PFASOMP_23	Date Samples Received	: 28-Mar-2023
Site	: ---	Issue Date	: 03-Apr-2023
Sampler	[redacted]	No. of samples received	: 37
Order number	[redacted]	No. of samples analysed	: 37

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_MW004_230321, 1200_SW059_230321, 1200_MW034_230321, 1200_QC300_230321, 1200_QC400_230321, 1200_QC500_230321, 1200_MW066_230321, 1200_MW080_230321, 1200_SW028_230321	**21-Mar-2023**	**29-Mar-2023**	17-Sep-2023	✓	**30-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC110_230321	**21-Mar-2023**	**30-Mar-2023**	17-Sep-2023	✓	**31-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW001_230322, 1200_MW004D_230322, 1200_MW012_230322, 1200_MW012D_230322, 1200_MW029_230322, 1200_MW031_230322, 1200_MW018_230322, 1200_MW023_230322, 1200_QC101_230322, 1200_SW007_230322	**22-Mar-2023**	**29-Mar-2023**	18-Sep-2023	✓	**30-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC108_230322, 1200_MW030_230322, 1200_SW123_230322, 1200_QC300_230322, 1200_QC400_230322, 1200_QC500_230322, 1200_SW091_230322, 1200_MW032_230322, 1200_SW086_230322, 1200_MW021_230322, 1200_MW021D_230322, 1200_SW001_230322	**22-Mar-2023**	**30-Mar-2023**	18-Sep-2023	✓	**31-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW112_230323, 1200_MW113_230323, 1200_QC301_230323, 1200_QC401_230323, 1200_SW075_230323	**23-Mar-2023**	**30-Mar-2023**	19-Sep-2023	✓	**31-Mar-2023**	19-Sep-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)							
1200_MW004_230321, 1200_SW059_230321, 1200_MW034_230321, 1200_QC300_230321, 1200_QC400_230321, 1200_QC500_230321, 1200_MW066_230321, 1200_MW080_230321, 1200_SW028_230321	**21-Mar-2023**	**29-Mar-2023**	17-Sep-2023	✓	**30-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC110_230321	**21-Mar-2023**	**30-Mar-2023**	17-Sep-2023	✓	**31-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW001_230322, 1200_MW004D_230322, 1200_MW012_230322, 1200_MW012D_230322, 1200_MW029_230322, 1200_MW031_230322, 1200_MW018_230322, 1200_MW023_230322, 1200_QC101_230322, 1200_SW007_230322	**22-Mar-2023**	**29-Mar-2023**	18-Sep-2023	✓	**30-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_QC108_230322, 1200_MW030_230322, 1200_SW123_230322, 1200_QC300_230322, 1200_QC400_230322, 1200_QC500_230322, 1200_SW091_230322, 1200_MW032_230322, 1200_SW086_230322, 1200_MW021_230322, 1200_MW021D_230322, 1200_SW001_230322	**22-Mar-2023**	**30-Mar-2023**	18-Sep-2023	✓	**31-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
1200_MW112_230323, 1200_MW113_230323, 1200_QC301_230323, 1200_QC401_230323, 1200_SW075_230323	**23-Mar-2023**	**30-Mar-2023**	19-Sep-2023	✓	**31-Mar-2023**	19-Sep-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) 1200_MW004_230321, 1200_SW059_230321, 1200_MW034_230321, 1200_QC300_230321, 1200_QC400_230321, 1200_QC500_230321, 1200_MW066_230321, 1200_MW080_230321, 1200_SW028_230321	**21-Mar-2023**	**29-Mar-2023**	17-Sep-2023	✓	**30-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_QC110_230321	**21-Mar-2023**	**30-Mar-2023**	17-Sep-2023	✓	**31-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_MW001_230322, 1200_MW004D_230322, 1200_MW012_230322, 1200_MW012D_230322, 1200_MW029_230322, 1200_MW031_230322, 1200_MW018_230322, 1200_MW023_230322, 1200_QC101_230322, 1200_SW007_230322	**22-Mar-2023**	**29-Mar-2023**	18-Sep-2023	✓	**30-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_QC108_230322, 1200_MW030_230322, 1200_SW123_230322, 1200_QC300_230322, 1200_QC400_230322, 1200_QC500_230322, 1200_SW091_230322, 1200_MW032_230322, 1200_SW086_230322, 1200_MW021_230322, 1200_MW021D_230322, 1200_SW001_230322	**22-Mar-2023**	**30-Mar-2023**	18-Sep-2023	✓	**31-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_MW112_230323, 1200_MW113_230323, 1200_QC301_230323, 1200_QC401_230323, 1200_SW075_230323	**23-Mar-2023**	**30-Mar-2023**	19-Sep-2023	✓	**31-Mar-2023**	19-Sep-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) 1200_MW004_230321, 1200_SW059_230321, 1200_MW034_230321, 1200_QC300_230321, 1200_QC400_230321, 1200_QC500_230321, 1200_MW066_230321, 1200_MW080_230321, 1200_SW028_230321	**21-Mar-2023**	**29-Mar-2023**	17-Sep-2023	✓	**30-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_QC110_230321	**21-Mar-2023**	**30-Mar-2023**	17-Sep-2023	✓	**31-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_MW001_230322, 1200_MW004D_230322, 1200_MW012_230322, 1200_MW012D_230322, 1200_MW029_230322, 1200_MW031_230322, 1200_MW018_230322, 1200_MW023_230322, 1200_QC101_230322, 1200_SW007_230322	**22-Mar-2023**	**29-Mar-2023**	18-Sep-2023	✓	**30-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_QC108_230322, 1200_MW030_230322, 1200_SW123_230322, 1200_QC300_230322, 1200_QC400_230322, 1200_QC500_230322, 1200_SW091_230322, 1200_MW032_230322, 1200_SW086_230322, 1200_MW021_230322, 1200_MW021D_230322, 1200_SW001_230322	**22-Mar-2023**	**30-Mar-2023**	18-Sep-2023	✓	**31-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_MW112_230323, 1200_MW113_230323, 1200_QC301_230323, 1200_QC401_230323, 1200_SW075_230323	**23-Mar-2023**	**30-Mar-2023**	19-Sep-2023	✓	**31-Mar-2023**	19-Sep-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) 1200_MW004_230321, 1200_SW059_230321, 1200_MW034_230321, 1200_QC300_230321, 1200_QC400_230321, 1200_QC500_230321, 1200_MW066_230321, 1200_MW080_230321, 1200_SW028_230321	**21-Mar-2023**	**29-Mar-2023**	17-Sep-2023	✓	**30-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_QC110_230321	**21-Mar-2023**	**30-Mar-2023**	17-Sep-2023	✓	**31-Mar-2023**	17-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_MW001_230322, 1200_MW004D_230322, 1200_MW012_230322, 1200_MW012D_230322, 1200_MW029_230322, 1200_MW031_230322, 1200_MW018_230322, 1200_MW023_230322, 1200_QC101_230322, 1200_SW007_230322	**22-Mar-2023**	**29-Mar-2023**	18-Sep-2023	✓	**30-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_QC108_230322, 1200_MW030_230322, 1200_SW123_230322, 1200_QC300_230322, 1200_QC400_230322, 1200_QC500_230322, 1200_SW091_230322, 1200_MW032_230322, 1200_SW086_230322, 1200_MW021_230322, 1200_MW021D_230322, 1200_SW001_230322	**22-Mar-2023**	**30-Mar-2023**	18-Sep-2023	✓	**31-Mar-2023**	18-Sep-2023	✓
HDPE (no PTFE) (EP231X) 1200_MW112_230323, 1200_MW113_230323, 1200_QC301_230323, 1200_QC401_230323, 1200_SW075_230323	**23-Mar-2023**	**30-Mar-2023**	19-Sep-2023	✓	**31-Mar-2023**	19-Sep-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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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.

AECOM

Q4AN(EV)-007-FM1

FQM - Generic Chain of Custody Form

[redacted]

12.

CONSULTANT: AECOM	ADDRESS / OFFICE: Da		Destination Laboratory
PROJECT MANAGER (PM):	SITE:		ALS SYD
PROJECT NUMBER & TASK: [redacted]	S.C.O. NO.: NT-1200_PFASCMP23	EMAIL REPORT TO:	
RESULTS REQUIRED (Date): Std	QUOTE NO.:	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)	

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:
QC200s to NMI

Notes: e.g. Highly contaminated samples e.g. "High PAHs expected". Extra volume for QC or trace LORs etc.

Subcon / Forwarded Split WO
Lab / Analysis: NMI
Organised By / Date:
Relinquished By / Date:
Connote / Courier: QC FWD
WO No: ES2310005
Attach By PO / Internal Sheet:

LAB OF ORIGIN: DARWIN

Environmental Division Sydney
Work Order Reference
ES2310005

Telephone : +61-2-8784 8555

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	ER23x-PFAS	HOLD	
1	1200_MW001-230322		22/03	W	PFAS	2	X		
2	1200_MW004D-230322					2	X		
3	1200_MW012-230322					2	X		
4	1200_MW012D-230322					2	X		
5	1200_MW029-230322					2	X		
6	1200_MW031-230322					2	X		
7	1200_MW018-230322					2	X		
8	1200_MW023-230322					2	X		
9	1200_QC101-230322					2	X		
*	1200_QC201-230322					2	X		PLS FWD TO NMI
10	1200_MW~~06~~004_230322		21/03			2	X		
*	1200_QC100-230322		22/03			2	X		PLS FWD TO NMI
11	1200_SW059-230321		21/03			2	X		
12	1200_MW034-230321		21/03			2	X		
13	1200_QC300-230321					1	X		
14	1200_QC400-230321					1	X		
15	1200_SW007_230322		22/03			1	X		
16	1200_QC500-230321		21/03			1	X		
17	1200_MW066-230321		21/03			2	X		
37	1200_SW001-230322		22/03			2	X		

RELINQUISHED BY:		RECEIVED BY		RECEIVED BY		METHOD OF SHIPMENT
Name:	Date:	Name:	Date:	Name: [redacted]	Date: 25/3/23	Con' Note No:
Of:	Time:	Of:	Time:	Of:	Time: 0830	Transport Co:

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

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ANZ

FQM - Generic Chain of Custody Form

2/2

AECOM

Q4AN(EV)-007-FM1

CONSULTANT: AECOM	ADDRESS / OFFICE: Darwin	SAMPLER: [redacted]	Destination Laboratory
PROJECT MANAGER (PM):	SITE:	MOBILE:	PHONE: ALS SYD
PROJECT NUMBER & TASK CODE: NT_1200_PFASOMP_23	P.O. NO.: [redacted]	EMAIL REPORT TO:	
RESULTS REQUIRED (Date): Std.	QUOTE NO: [redacted]	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)	

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples e.g. "High PAHs expected". Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	MATRIX	DATE	Time	CONTAINER INFORMATION Type / Code	Total bottles	EP231x_PFAS										HOLD	
18	1200_MW080_220321		21/03	W	PFAS	2	X											
19	1200_SW028_220321		"	"	"	1	X											
20	1200_QC110_230321		"	"	"	2	X											
~~21~~	1200_QC210_230321		"	"	"	2	X											PLS FWD TO NMI
21	1200_MW112_230323		23/03			1	X											
22	1200_MW113_230323		"			1	X											
23	1200_QC301_230323		"			1	X											
24	1200_QC401_230323		"			1	X											
25	1200_SW075_230323		"			1	X											
26	1200_QC108_230322		22/03			2	X											
27	1200_MW030_230322		"			2	X											
28	1200_SW123_230322		"			2	X											
29	1200_QC300_230322		"			1	X											
30	1200_QC400_230322		"			1	X											
31	1200_QC500_230322		"			1	X											
32	1200_SW091_230322		"			2	X											
33	1200_MW032_230322		"			2	X											
34	1200_SW086_230322		"			2	X											
35	1200_MW021_230322		"			1	X											
36	1200_MW021D_230322		22/03			1	X											

LAB OF ORIGIN DARWIN

RELINQUISHED BY:	RECEIVED BY	RECEIVED BY	METHOD OF SHIPMENT
Name: [redacted]	Name:	Name:	
Of: AECOM	Of:	Of:	
Date: 23.03.23	Date:	Date:	Con' Note No:
Time: 14:00	Time:	Time:	Transport Co:

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

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SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2310005**		
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]		NSW Australia 2164
E-mail	: [redacted]	E-mail	: [redacted]
Project	: NT_1200_PFASOMP_23	Page	: 1 of 3
Order number	: [redacted]	Quote number	: ES2021AECOMAU0044 (EN/004/21)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: [redacted]		

Dates

Date Samples Received	: 28-Mar-2023 08:30	Issue Date	: 28-Mar-2023
Client Requested Due Date	: 03-Apr-2023	Scheduled Reporting Date	: **03-Apr-2023**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 17.2'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 37 / 37

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
- **Both QC500s were received without dates listed. The bottle included with other QC samples dated for the 22nd was assumed to be sample 1200_QC500_230322. The remaining bottle assumed to be 1200_QC500_230321.**
- **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.**
- **QC Forward analysis will be conducted by NMI.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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)
ES2310005-001	22-Mar-2023 00:00	1200_MW001_230322	✓
ES2310005-002	22-Mar-2023 00:00	1200_MW004D_230322	✓
ES2310005-003	22-Mar-2023 00:00	1200_MW012_230322	✓
ES2310005-004	22-Mar-2023 00:00	1200_MW012D_230322	✓
ES2310005-005	22-Mar-2023 00:00	1200_MW029_230322	✓
ES2310005-006	22-Mar-2023 00:00	1200_MW031_230322	✓
ES2310005-007	22-Mar-2023 00:00	1200_MW018_230322	✓
ES2310005-008	22-Mar-2023 00:00	1200_MW023_230322	✓
ES2310005-009	22-Mar-2023 00:00	1200_QC101_230322	✓
ES2310005-010	21-Mar-2023 00:00	1200_MW004_230321	✓
ES2310005-011	21-Mar-2023 00:00	1200_SW059_230321	✓
ES2310005-012	21-Mar-2023 00:00	1200_MW034_230321	✓
ES2310005-013	21-Mar-2023 00:00	1200_QC300_230321	✓
ES2310005-014	21-Mar-2023 00:00	1200_QC400_230321	✓
ES2310005-015	22-Mar-2023 00:00	1200_SW007_230322	✓
ES2310005-016	21-Mar-2023 00:00	1200_QC500_230321	✓
ES2310005-017	21-Mar-2023 00:00	1200_MW066_230321	✓
ES2310005-018	21-Mar-2023 00:00	1200_MW080_230321	✓
ES2310005-019	21-Mar-2023 00:00	1200_SW028_230321	✓
ES2310005-020	21-Mar-2023 00:00	1200_QC110_230321	✓
ES2310005-021	23-Mar-2023 00:00	1200_MW112_230323	✓
ES2310005-022	23-Mar-2023 00:00	1200_MW113_230323	✓
ES2310005-023	23-Mar-2023 00:00	1200_QC301_230323	✓
ES2310005-024	23-Mar-2023 00:00	1200_QC401_230323	✓
ES2310005-025	23-Mar-2023 00:00	1200_SW075_230323	✓
ES2310005-026	22-Mar-2023 00:00	1200_QC108_230322	✓
ES2310005-027	22-Mar-2023 00:00	1200_MW030_230322	✓
ES2310005-028	22-Mar-2023 00:00	1200_SW123_230322	✓
ES2310005-029	22-Mar-2023 00:00	1200_QC300_230322	✓
ES2310005-030	22-Mar-2023 00:00	1200_QC400_230322	✓
ES2310005-031	22-Mar-2023 00:00	1200_QC500_230322	✓
ES2310005-032	22-Mar-2023 00:00	1200_SW091_230322	✓
ES2310005-033	22-Mar-2023 00:00	1200_MW032_230322	✓
ES2310005-034	22-Mar-2023 00:00	1200_SW086_230322	✓
ES2310005-035	22-Mar-2023 00:00	1200_MW021_230322	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
ES2310005-036	22-Mar-2023 00:00	1200_MW021D_230322	✓
ES2310005-037	22-Mar-2023 00:00	1200_SW001_230322	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV) — Email
- Chain of Custody (CoC) (COC) — Email

DERP ESDAT REPORTS

- EDI Format - ESD[redacted] — Email

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email
- Chain of Custody (CoC) (COC) — Email
- EDI Format - ENMRG (ENMRG) — Email
- EDI Format - EQUIS_V5_AECOM_SAMPLE (EQUIS_V5_AECOM_SAMPLE) — Email
- EDI Format - ESDAT (ESDAT) — Email
- Purchase Order Request Letter (PO_Request) — Email

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email
- Chain of Custody (CoC) (COC) — Email
- EDI Format - ENMRG (ENMRG) — Email
- EDI Format - EQUIS_V5_AECOM_SAMPLE (EQUIS_V5_AECOM_SAMPLE) — Email
- EDI Format - ESDAT (ESDAT) — Email

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email
- Chain of Custody (CoC) (COC) — Email
- EDI Format - ENMRG (ENMRG) — Email
- EDI Format - EQUIS_V5_AECOM_SAMPLE (EQUIS_V5_AECOM_SAMPLE) — Email
- EDI Format - ESDAT (ESDAT) — Email

[redacted]

CERTIFICATE OF ANALYSIS

Work Order	: **ES2310005**	Page	: 1 of 19
Client	: **AECOM AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	[redacted]	Contact	: [redacted]
Address	[redacted]	Address	: [redacted]
Telephone	: —	Telephone	: [redacted]
Project	: NT_1200_PFASOMP_23	Date Samples Received	: 28-Mar-2023 08:30
Order number	: [redacted]	Date Analysis Commenced	: 28-Mar-2023
C-O-C number	: —	Issue Date	: 03-Apr-2023 09:47
Sampler	[redacted]		
Site	: —		
Quote number	: EN/004/21		
No. of samples received	: 37		
No. of samples analysed	: 37		

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*
[redacted]	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.

- 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.
- 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: WATER (Matrix: WATER)				Sample ID	1200_MW001_230322	1200_MW004D_230322	1200_MW012_230322	1200_MW012D_230322	1200_MW029_230322
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-001	ES2310005-002	ES2310005-003	ES2310005-004	ES2310005-005
					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		**0.04**	<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		**0.11**	<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: WATER (Matrix: WATER)				Sample ID	1200_MW001_230322	1200_MW004D_230322	1200_MW012_230322	1200_MW012D_230322	1200_MW029_230322
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-001	ES2310005-002	ES2310005-003	ES2310005-004	ES2310005-005
					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		**0.15**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.15**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.15**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**100**	**94.9**	**97.4**	**100**	**97.7**
13C8-PFOA	---	0.02	%		**94.5**	**92.5**	**94.7**	**91.8**	**89.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW031_230322	1200_MW018_230322	1200_MW023_230322	1200_QC101_230322	1200_MW004_230321
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	21-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-006	ES2310005-007	ES2310005-008	ES2310005-009	ES2310005-010
					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	**0.02**	**0.06**
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		**0.03**	<0.01	<0.01	**0.05**	**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	<0.02	<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: WATER (Matrix: WATER)				Sample ID	1200_MW031_230322	1200_MW018_230322	1200_MW023_230322	1200_QC101_230322	1200_MW004_230321
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	21-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-006	ES2310005-007	ES2310005-008	ES2310005-009	ES2310005-010
					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		**0.03**	<0.01	<0.01	**0.09**	**0.15**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	<0.01	<0.01	**0.07**	**0.15**
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.03**	<0.01	<0.01	**0.09**	**0.15**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**107**	**94.7**	**96.0**	**102**	**110**
13C8-PFOA	---	0.02	%		**95.9**	**92.1**	**93.1**	**95.3**	**95.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_SW059_230321	1200_MW034_230321	1200_QC300_230321	1200_QC400_230321	1200_SW007_230322
				Sampling date / time	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-011	ES2310005-012	ES2310005-013	ES2310005-014	ES2310005-015
					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		**0.05**	**0.02**	<0.01	<0.01	**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		**0.17**	**0.08**	<0.01	<0.01	**0.04**
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	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.03**	**0.05**	<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: WATER (Matrix: WATER)				Sample ID	1200_SW059_230321	1200_MW034_230321	1200_QC300_230321	1200_QC400_230321	1200_SW007_230322
				Sampling date / time	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-011	ES2310005-012	ES2310005-013	ES2310005-014	ES2310005-015
					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		**0.25**	**0.19**	<0.01	<0.01	**0.06**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.22**	**0.10**	<0.01	<0.01	**0.06**
Sum of PFAS (WA DER List)	---	0.01	µg/L		**0.25**	**0.19**	<0.01	<0.01	**0.06**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**106**	**94.8**	**101**	**97.9**	**96.6**
13C8-PFOA	---	0.02	%		**93.0**	**94.5**	**96.3**	**93.4**	**92.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC500_230321	1200_MW066_230321	1200_MW080_230321	1200_SW028_230321	1200_QC110_230321
				Sampling date / time	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-016	ES2310005-017	ES2310005-018	ES2310005-019	ES2310005-020
					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	**0.03**	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**0.13**	<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	**0.52**	**0.02**	<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	**0.03**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.06**	**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	**0.03**	<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: WATER (Matrix: WATER)				Sample ID	1200_QC500_230321	1200_MW066_230321	1200_MW080_230321	1200_SW028_230321	1200_QC110_230321
				Sampling date / time	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00	21-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-016	ES2310005-017	ES2310005-018	ES2310005-019	ES2310005-020
					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	**0.79**	**0.07**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.65**	**0.02**	<0.01	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.76**	**0.07**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**98.4**	**97.2**	**94.6**	**99.0**	**97.3**
13C8-PFOA	---	0.02	%		**94.0**	**92.1**	**94.2**	**94.5**	**99.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW112_230323	1200_MW113_230323	1200_QC301_230323	1200_QC401_230323	1200_SW075_230323
				Sampling date / time	23-Mar-2023 00:00	23-Mar-2023 00:00	23-Mar-2023 00:00	23-Mar-2023 00:00	23-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-021	ES2310005-022	ES2310005-023	ES2310005-024	ES2310005-025
					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: WATER (Matrix: WATER)				Sample ID	1200_MW112_230323	1200_MW113_230323	1200_QC301_230323	1200_QC401_230323	1200_SW075_230323
				Sampling date / time	23-Mar-2023 00:00	23-Mar-2023 00:00	23-Mar-2023 00:00	23-Mar-2023 00:00	23-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-021	ES2310005-022	ES2310005-023	ES2310005-024	ES2310005-025
					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	%		**97.4**	**94.4**	**100**	**112**	**101**
13C8-PFOA	---	0.02	%		**97.7**	**100**	**98.9**	**100**	**99.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC108_230322	1200_MW030_230322	1200_SW123_230322	1200_QC300_230322	1200_QC400_230322
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-026	ES2310005-027	ES2310005-028	ES2310005-029	ES2310005-030
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	**0.06**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	**0.06**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**0.03**	**0.34**	**0.07**	<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	**0.08**	**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	**0.03**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.30**	**0.04**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.07**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.15**	**0.02**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC108_230322	1200_MW030_230322	1200_SW123_230322	1200_QC300_230322	1200_QC400_230322
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-026	ES2310005-027	ES2310005-028	ES2310005-029	ES2310005-030
					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	**0.11**	**1.02**	**0.14**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.11**	**0.35**	**0.08**	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.11**	**0.96**	**0.14**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**110**	**103**	**111**	**102**	**109**
13C8-PFOA	---	0.02	%		**98.7**	**98.9**	**99.4**	**101**	**99.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC500_230322	1200_SW091_230322	1200_MW032_230322	1200_SW086_230322	1200_MW021_230322
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-031	ES2310005-032	ES2310005-033	ES2310005-034	ES2310005-035
					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**	**0.02**	<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	**0.07**	**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: WATER (Matrix: WATER)				Sample ID	1200_QC500_230322	1200_SW091_230322	1200_MW032_230322	1200_SW086_230322	1200_MW021_230322
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00	22-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		ES2310005-031	ES2310005-032	ES2310005-033	ES2310005-034	ES2310005-035
					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**	**0.11**	**0.01**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.01**	**0.09**	**0.01**	<0.01
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.01**	**0.11**	**0.01**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**105**	**106**	**107**	**109**	**104**
13C8-PFOA	---	0.02	%		**100**	**103**	**99.9**	**102**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW021D_230322	1200_SW001_230322	---	---	---
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2310005-036	ES2310005-037	------	------	------
					Result	Result	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**0.02**	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.03**	---	---	---
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW021D_230322	1200_SW001_230322	---	---	---
				Sampling date / time	22-Mar-2023 00:00	22-Mar-2023 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2310005-036	ES2310005-037	------	------	------
					Result	Result	---	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		<0.01	**0.05**	---	---	---
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.05**	---	---	---
Sum of PFAS (WA DER List)	---	0.01	µg/L		<0.01	**0.05**	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**112**	**101**	---	---	---
13C8-PFOA	---	0.02	%		**99.9**	**102**	---	---	---

Surrogate Control Limits

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

Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA

REPORT OF ANALYSIS

Report No. RN1388287

Client	: AECOM AUSTRALIA PTY LTD	**Job No.**	: AECO06/230329
	[redacted]	**Quote No.**	: QT-02018
		Order No.	: [redacted]
		Date Received	: 29-MAR-2023
Attention	: [redacted]	**Sampled By**	: CLIENT
Project Name	: NT_1200_PFASOMP_23		
Your Client Services Manager	: [redacted]	**Phone**	: [redacted]

Lab Reg No.	Sample Ref	Sample Description
N23/006116	1200_QC201_230322	WATER 22/03/23
N23/006117	1200_QC200_230322	WATER 22/03/23
N23/006118	1200_QC210_230321	WATER 21/03/23

Lab Reg No.		N23/006116	N23/006117	N23/006118		
Date Sampled		22-MAR-2023	22-MAR-2023	21-MAR-2023		
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05	<0.05	<0.05		NR70
PFPeA (2706-90-3)	ug/L	<0.02	<0.02	<0.02		NR70
PFHxA (307-24-4)	ug/L	0.014	<0.01	<0.01		NR70
PFHpA (375-85-9)	ug/L	<0.01	<0.01	<0.01		NR70
PFOA (335-67-1)	ug/L	<0.01	<0.01	<0.01		NR70
PFNA (375-95-1)	ug/L	<0.01	<0.01	<0.01		NR70
PFDA (335-76-2)	ug/L	<0.01	<0.01	<0.01		NR70
PFUdA (2058-94-8)	ug/L	<0.01	<0.01	<0.01		NR70
PFDoA (307-55-1)	ug/L	<0.01	<0.01	<0.01		NR70
PFTrDA (72629-94-8)	ug/L	<0.02	<0.02	<0.02		NR70
PFTeDA (376-06-7)	ug/L	<0.02	<0.02	<0.02		NR70
PFHxDA (67905-19-5)	ug/L	<0.02	<0.02	<0.02		NR70
PFODA (16517-11-6)	ug/L	<0.05	<0.05	<0.05		NR70
FOUEA (70887-84-2)	ug/L	<0.01	<0.01	<0.01		NR70
PFDS (335-77-3)	ug/L	<0.01	<0.01	<0.01		NR70
PFPeS (2706-91-4)	ug/L	<0.01	<0.01	<0.01		NR70
PFHxS (355-46-4)	ug/L	0.019	<0.01	<0.01		NR70
PFHpS (375-92-8)	ug/L	<0.01	<0.01	<0.01		NR70
PFOS (1763-23-1)	ug/L	0.060	<0.02	<0.02		NR70
PFNS (68259-12-1)	ug/L	<0.01	<0.01	<0.01		NR70
PFBS (375-73-5)	ug/L	<0.01	<0.01	<0.01		NR70
PFOSA (754-91-6)	ug/L	<0.01	<0.01	<0.01		NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02	<0.02	<0.02		NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02	<0.02	<0.02		NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01	<0.01	<0.01		NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01	<0.01	<0.01		NR70
N-MeFOSE (24448-09-7)	ug/L	<0.05	<0.05	<0.05		NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05	<0.05	<0.05		NR70

REPORT OF ANALYSIS

Report No. RN1388287

Lab Reg No.		N23/006116	N23/006117	N23/006118		
Date Sampled		22-MAR-2023	22-MAR-2023	21-MAR-2023		
	Units					Method
PFAS (per-and poly-fluoroalkyl substances)						
4:2 FTS (757124-72-4)	ug/L	<0.01	<0.01	<0.01		NR70
6:2 FTS (27619-97-2)	ug/L	<0.01	<0.01	<0.01		NR70
8:2 FTS (39108-34-4)	ug/L	<0.01	<0.01	<0.01		NR70
10:2 FTS (120226-60-0)	ug/L	<0.01	<0.01	<0.01		NR70
8:2 diPAP (678-41-1)	ug/L	<0.02	<0.02	<0.02		NR70
PFBA (Surrogate Recovery)	%	90	90	88		NR70
PFPeA (Surrogate Recovery)	%	92	91	89		NR70
PFHxA (Surrogate Recovery)	%	87	88	84		NR70
PFHpA (Surrogate Recovery)	%	88	86	81		NR70
PFOA (Surrogate Recovery)	%	92	89	88		NR70
PFNA (Surrogate Recovery)	%	93	94	86		NR70
PFDA (Surrogate Recovery)	%	89	87	79		NR70
PFUdA (Surrogate Recovery)	%	87	85	76		NR70
PFDoA (Surrogate Recovery)	%	80	79	69		NR70
PFTeDA (Surrogate Recovery)	%	81	82	66		NR70
PFHxDA (Surrogate Recovery)	%	89	84	79		NR70
FOUEA (Surrogate Recovery)	%	79	73	74		NR70
PFBS (Surrogate Recovery)	%	78	79	84		NR70
PFHxS (Surrogate Recovery)	%	89	85	86		NR70
PFOS (Surrogate Recovery)	%	86	84	84		NR70
PFOSA (Surrogate Recovery)	%	77	75	67		NR70
N-MeFOSA (Surrogate Recovery)	%	66	62	54		NR70
N-EtFOSA (Surrogate Recovery)	%	66	66	54		NR70
N-MeFOSAA (Surrogate Recovery)	%	67	81	59		NR70
N-EtFOSAA (Surrogate Recovery)	%	66	75	63		NR70
N-MeFOSE (Surrogate Recovery)	%	72	64	58		NR70
N-EtFOSE (Surrogate Recovery)	%	69	64	56		NR70
4:2 FTS (Surrogate Recovery)	%	85	79	96		NR70
6:2 FTS (Surrogate Recovery)	%	84	86	87		NR70
8:2 FTS (Surrogate Recovery)	%	76	77	73		NR70
8:2 diPAP (Surrogate Recovery)	%	87	104	76		NR70
Dates						
Date extracted		31-MAR-2023	31-MAR-2023	31-MAR-2023		
Date analysed		31-MAR-2023	31-MAR-2023	31-MAR-2023		

N23/006116
to
N23/006118

REPORT OF ANALYSIS

PFOS and PFHxS are quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

[redacted]

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WORLD RECOGNISED
ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) as received and tested.

This Report supersedes reports: *RN1388215*

Measurement Uncertainty is available upon request.

Note: Sampling date(s) have been provided by the client.
Chemical Accreditation 198: [redacted]

[redacted]

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM AUSTRALIA PTY LTD

NMI QA Report No: AECO06/230329 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.05	<0.05	NA	NA	NA	120	NA
PFPeA (2706-90-3)	NR70	0.02	<0.02	NA	NA	NA	116	NA
PFHxA (307-24-4)	NR70	0.01	<0.01	NA	NA	NA	116	NA
PFHpA (375-85-9)	NR70	0.01	<0.01	NA	NA	NA	114	NA
PFOA (335-67-1)	NR70	0.01	<0.01	NA	NA	NA	126	NA
PFNA (375-95-1)	NR70	0.01	<0.01	NA	NA	NA	117	NA
PFDA (335-76-2)	NR70	0.01	<0.01	NA	NA	NA	112	NA
PFUdA (2058-94-8)	NR70	0.01	<0.01	NA	NA	NA	119	NA
PFDoA (307-55-1)	NR70	0.01	<0.01	NA	NA	NA	123	NA
PFTrDA (72629-94-8)	NR70	0.02	<0.02	NA	NA	NA	122	NA
PFTeDA (376-06-7)	NR70	0.02	<0.02	NA	NA	NA	127	NA
PFHxDA (67905-19-5)	NR70	0.02	<0.02	NA	NA	NA	116	NA
PFODA (16517-11-6)	NR70	0.05	<0.05	NA	NA	NA	146	NA
FOUEA (70887-84-2)	NR70	0.01	<0.01	NA	NA	NA	110	NA
PFBS (375-73-5)	NR70	0.01	<0.01	NA	NA	NA	116	NA
PFPeS (2706-91-4)	NR70	0.01	<0.01	NA	NA	NA	124	NA
PFHxS (355-46-4)	NR70	0.01	<0.01	NA	NA	NA	114	NA
PFHpS (375-92-8)	NR70	0.01	<0.01	NA	NA	NA	117	NA
PFOS (1763-23-1)	NR70	0.02	<0.02	NA	NA	NA	121	NA
PFNS (68259-12-1)	NR70	0.01	<0.01	NA	NA	NA	112	NA
PFDS (335-77-3)	NR70	0.01	<0.01	NA	NA	NA	104	NA
PFOSA (754-91-6)	NR70	0.01	<0.01	NA	NA	NA	114	NA
N-MeFOSA (31506-32-8)	NR70	0.02	<0.02	NA	NA	NA	122	NA
N-EtFOSA (4151-50-2)	NR70	0.02	<0.02	NA	NA	NA	117	NA
N-MeFOSAA (2355-31-9)	NR70	0.01	<0.01	NA	NA	NA	112	NA
N-EtFOSAA(2991-50-6)	NR70	0.01	<0.01	NA	NA	NA	116	NA
N-MeFOSE (24448-09-7)	NR70	0.05	<0.05	NA	NA	NA	116	NA
N-EtFOSE (1691-99-2)	NR70	0.05	<0.05	NA	NA	NA	116	NA
4:2 FTS (757124-72-4)	NR70	0.01	<0.01	NA	NA	NA	128	NA
6:2 FTS (27619-97-2)	NR70	0.01	<0.01	NA	NA	NA	128	NA
8:2 FTS (39108-34-4)	NR70	0.01	<0.01	NA	NA	NA	123	NA
10:2 FTS (120226-60-0)	NR70	0.01	<0.01	NA	NA	NA	92	NA
8:2 diPAP (678-41-1)	NR70	0.02	<0.02	NA	NA	NA	120	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed: [redacted]

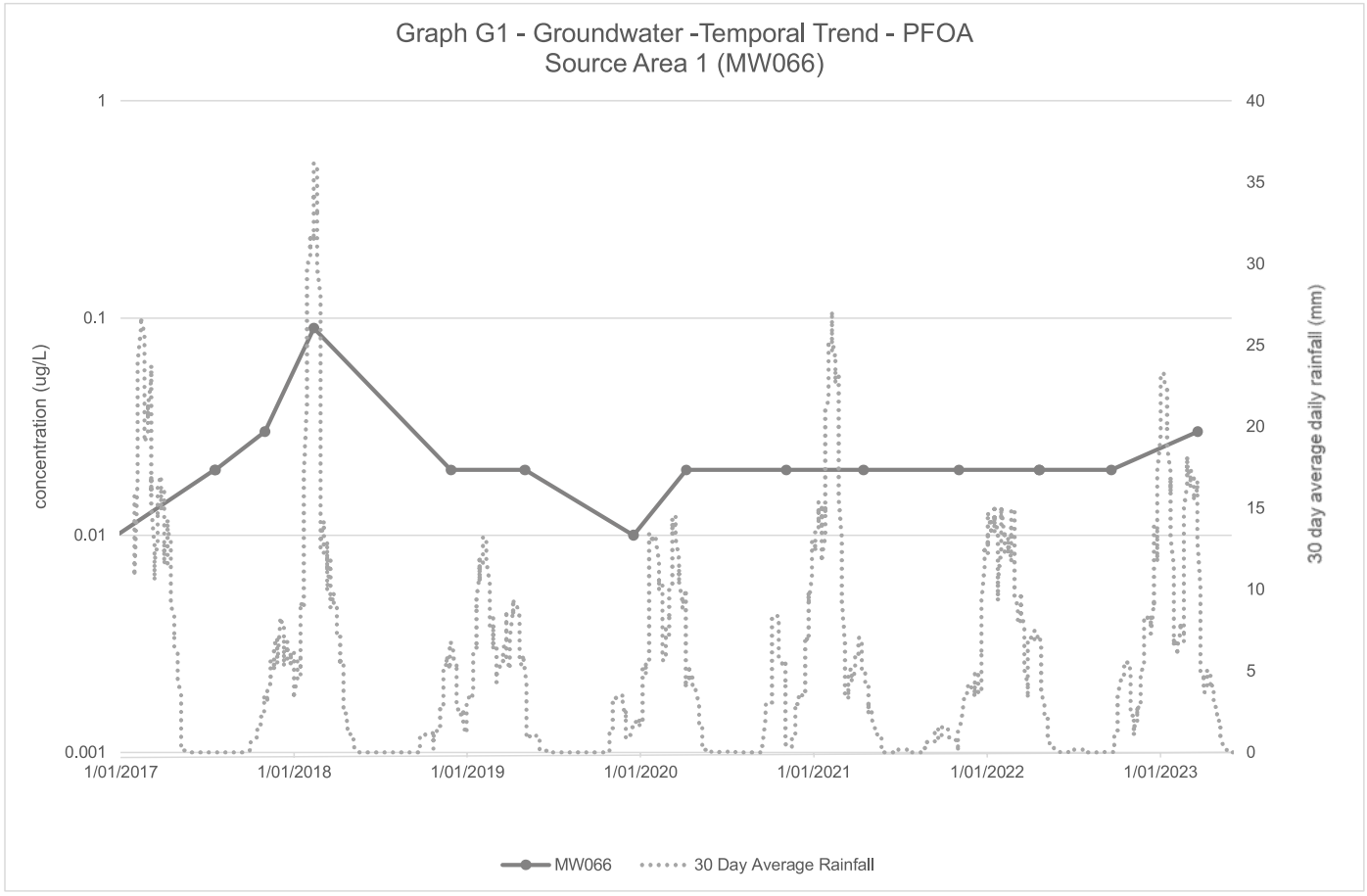
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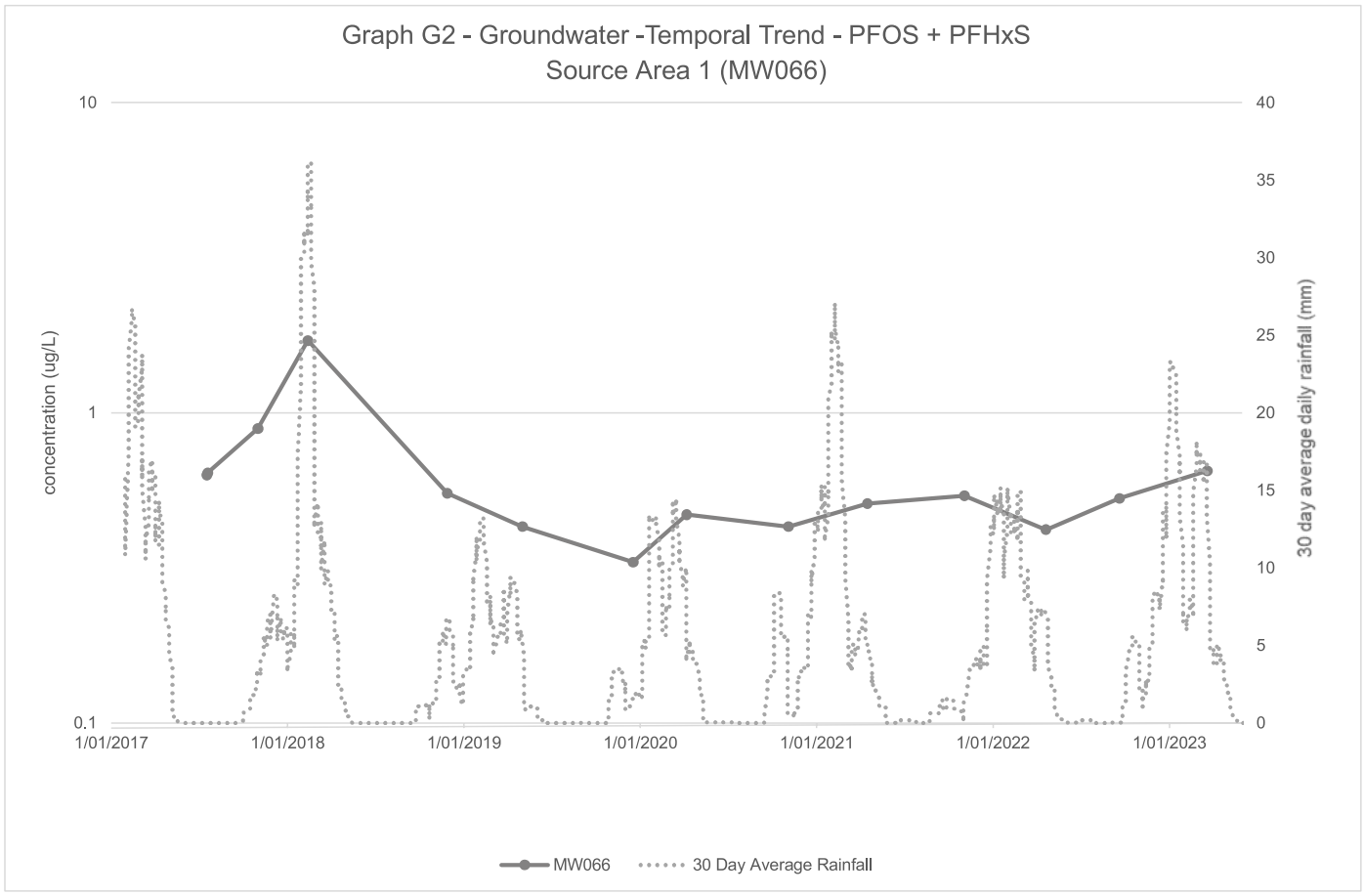
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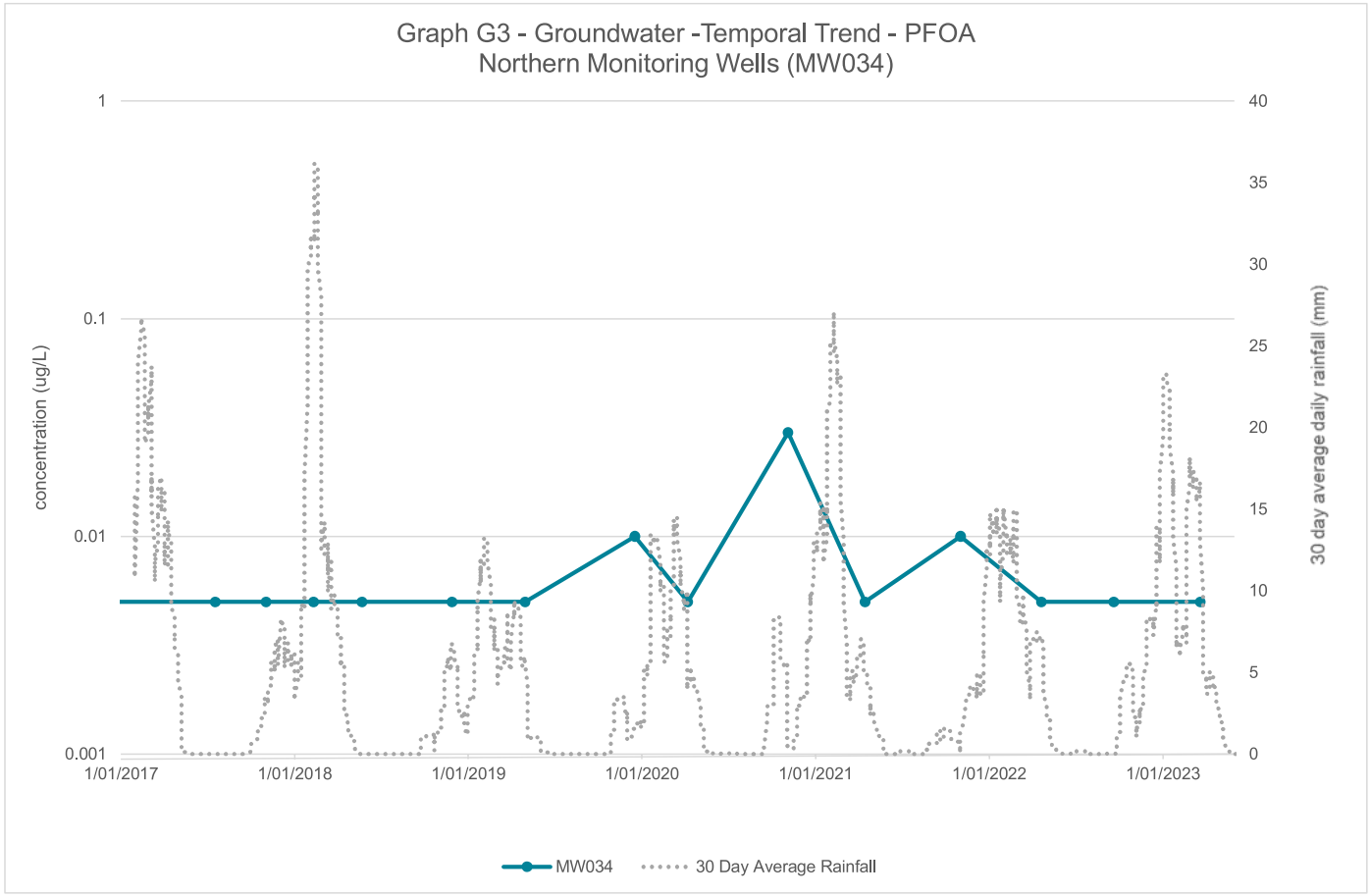
Appendix D

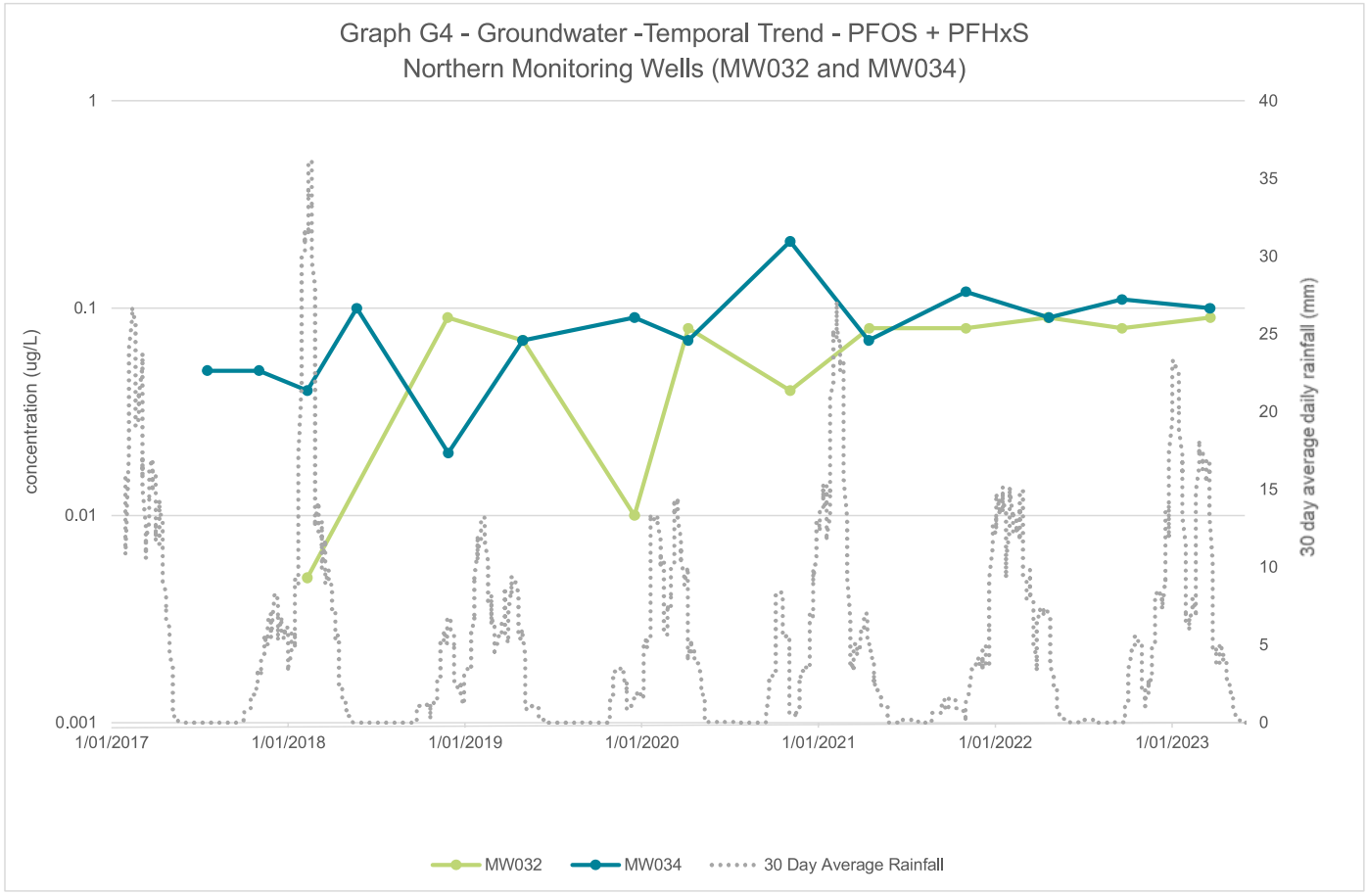
Graphs

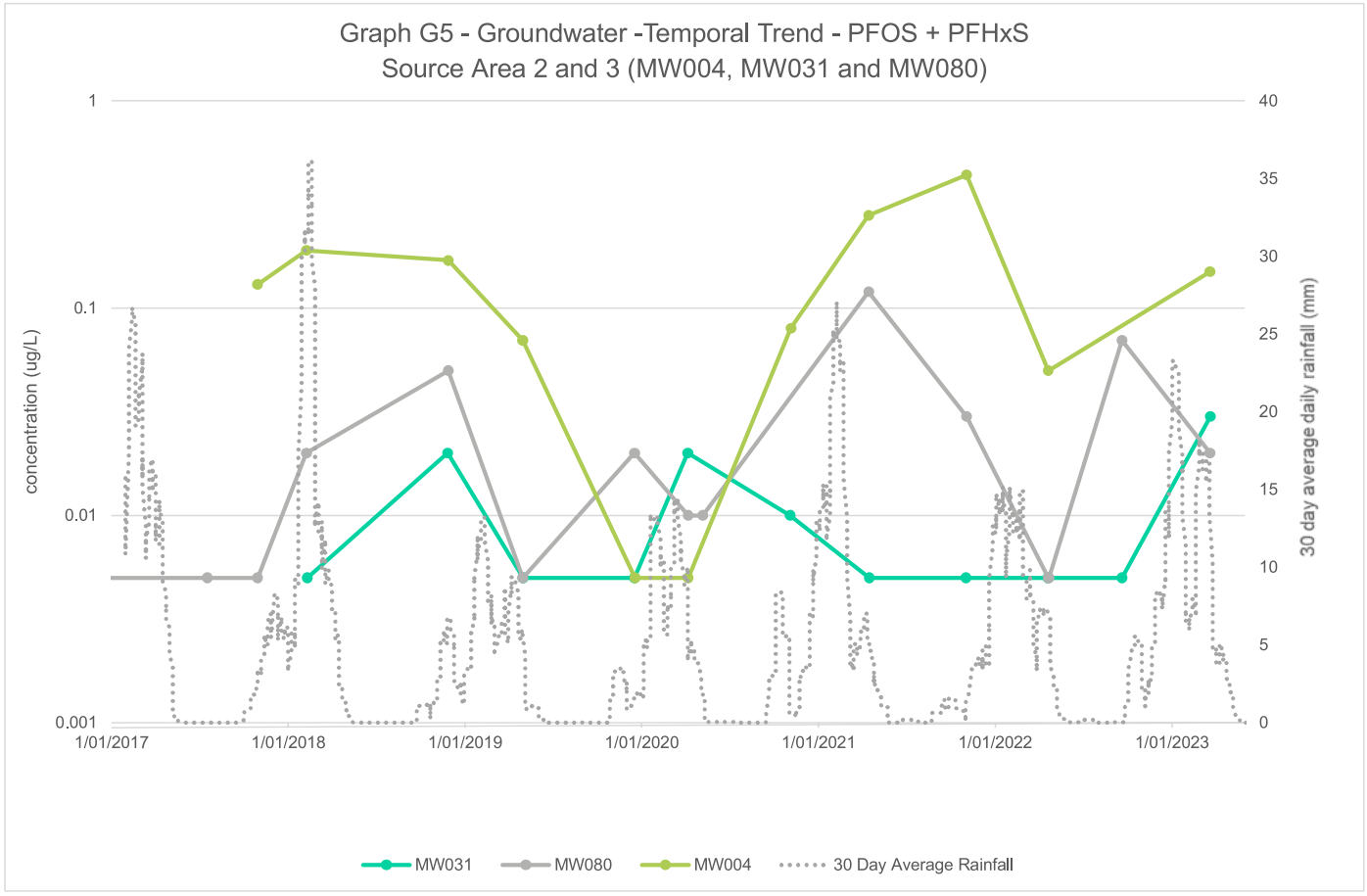
Appendix D Graphs

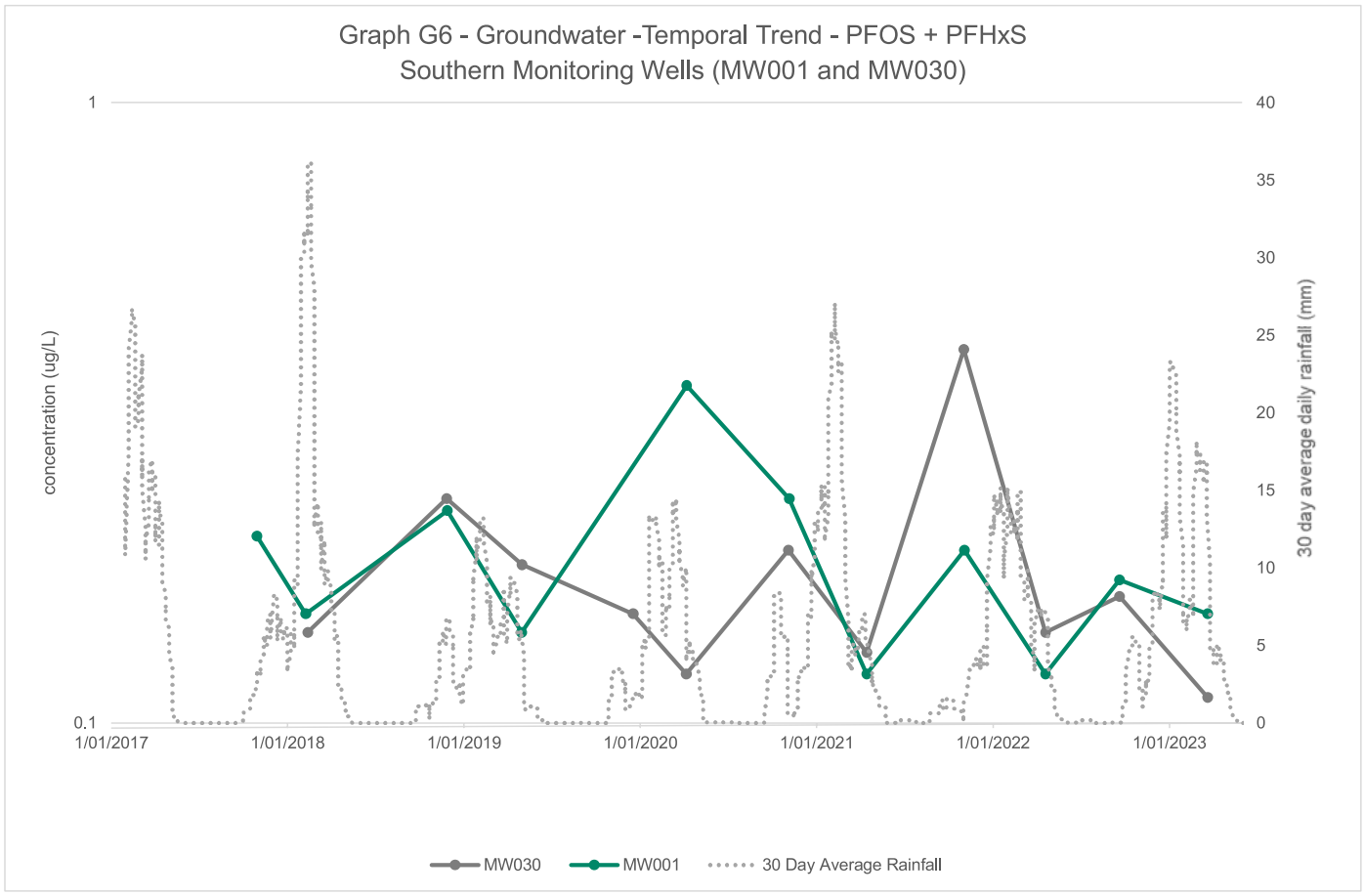

Graph G1 - Groundwater -Temporal Trend - PFOA
Source Area 1 (MW066)
concentration (ug/L)
1
0.1
0.01
0.001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
MW066
30 Day Average Rainfall

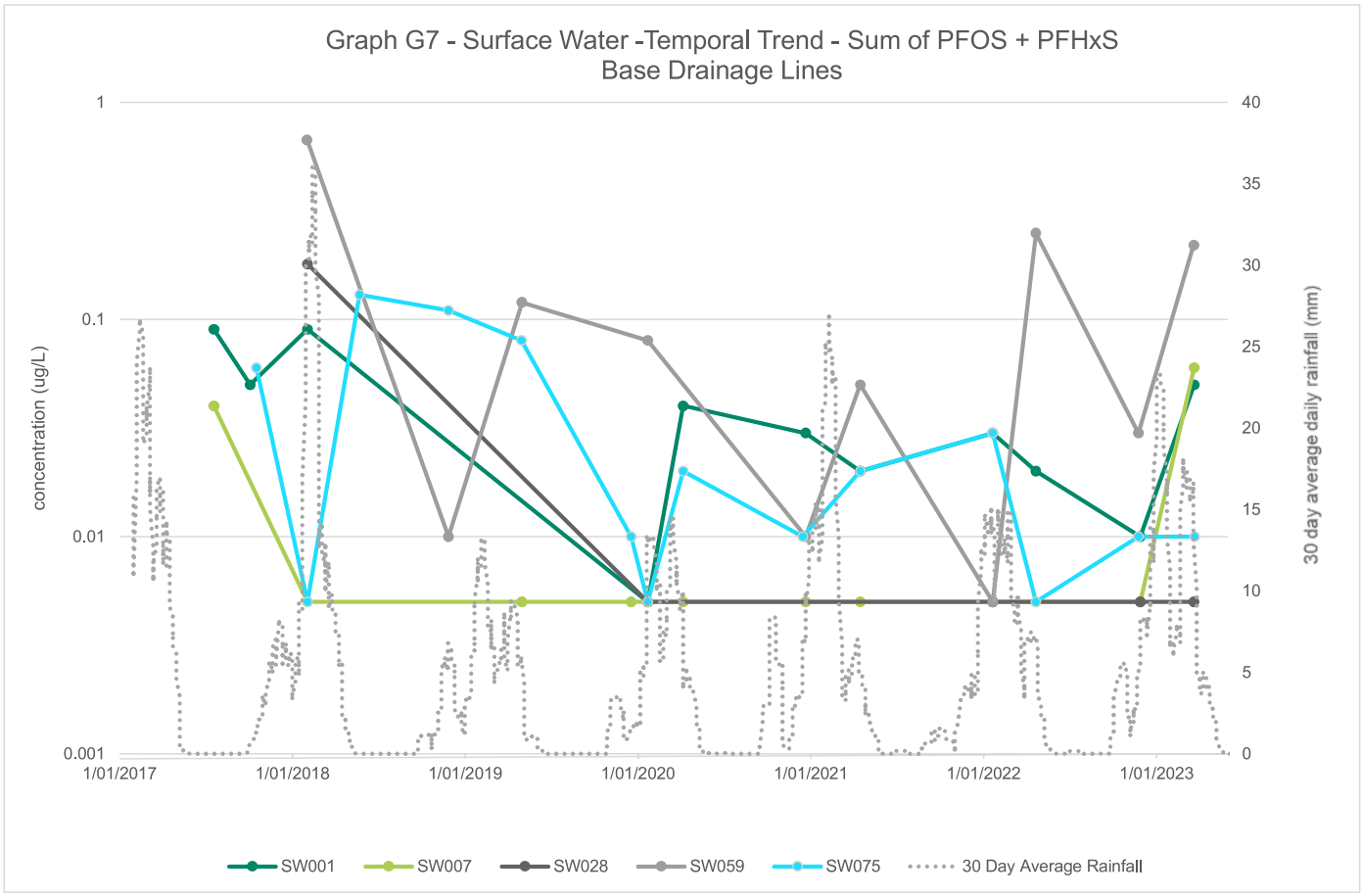

Graph G2 - Groundwater -Temporal Trend - PFOS + PFHxS
Source Area 1 (MW066)
concentration (ug/L)
10
1
0.1
40
35
30
25
20
15
10
5
0
30 day average daily rainfall (mm)
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
MW066
30 Day Average Rainfall

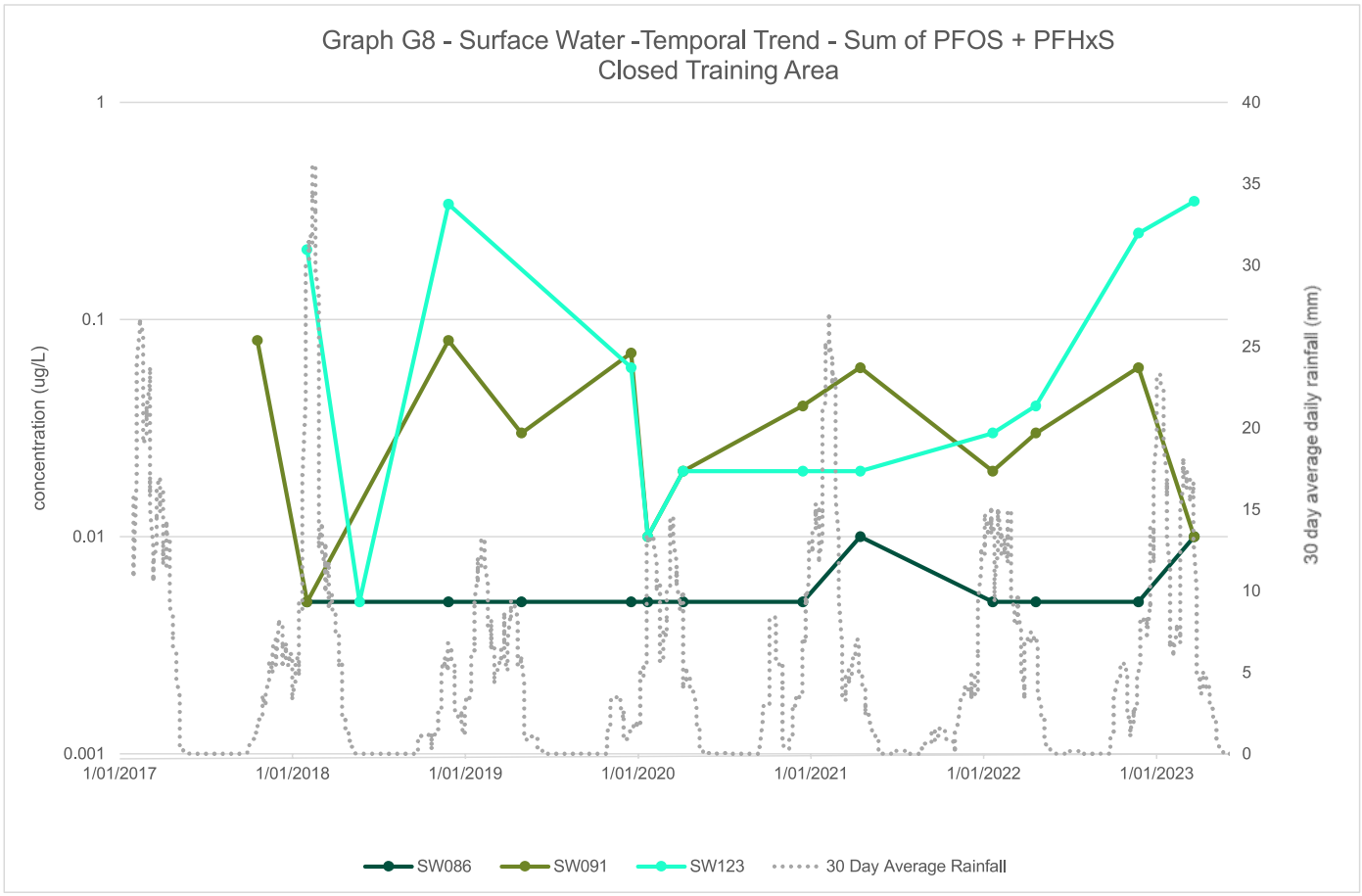

Graph G3 - Groundwater -Temporal Trend - PFOA
Northern Monitoring Wells (MW034)
concentration (ug/L)
1
0.1
0.01
0.001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
MW034
30 Day Average Rainfall

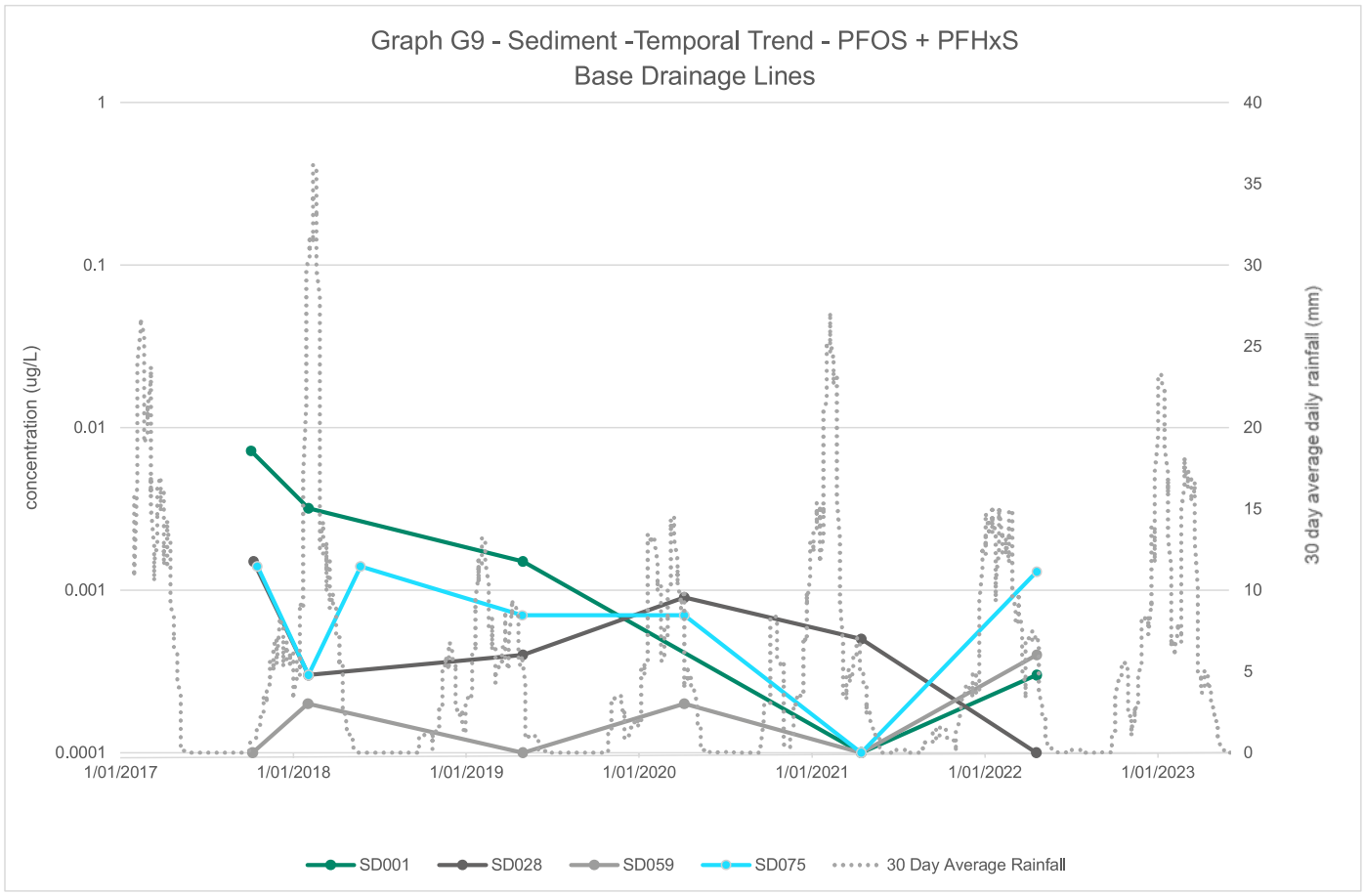

Graph G4 - Groundwater -Temporal Trend - PFOS + PFHxS
Northern Monitoring Wells (MW032 and MW034)
concentration (ug/L)
1
0.1
0.01
0.001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
MW032
MW034
30 Day Average Rainfall

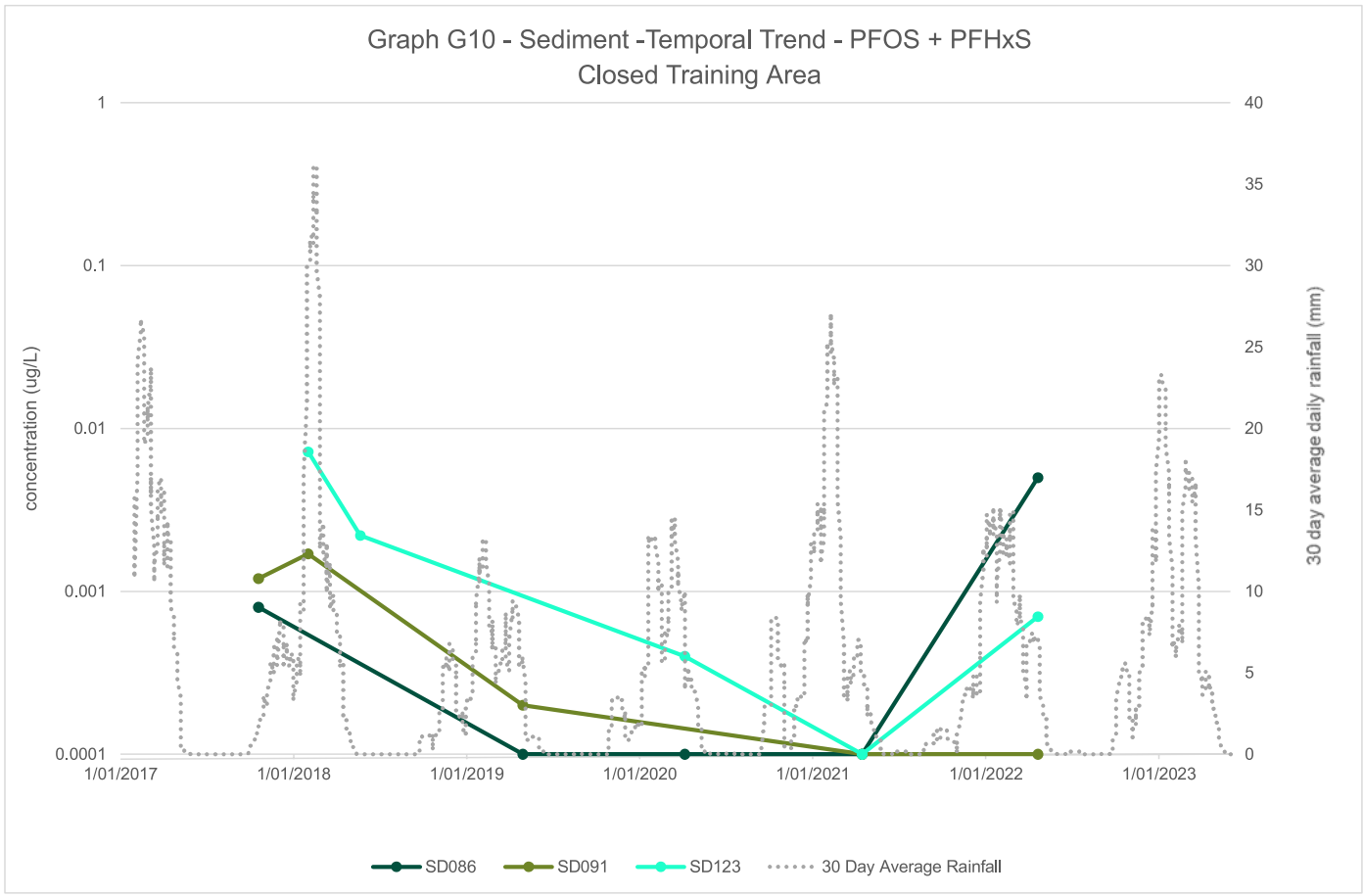

Graph G5 - Groundwater -Temporal Trend - PFOS + PFHxS
Source Area 2 and 3 (MW004, MW031 and MW080)
concentration (ug/L)
1
0.1
0.01
0.001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
MW031
MW080
MW004
30 Day Average Rainfall


Graph G6 - Groundwater -Temporal Trend - PFOS + PFHxS
Southern Monitoring Wells (MW001 and MW030)
concentration (ug/L)
1
0.1
40
35
30
25
20
15
10
5
0
30 day average daily rainfall (mm)
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
MW030
MW001
30 Day Average Rainfall


Graph G7 - Surface Water -Temporal Trend - Sum of PFOS + PFHxS
Base Drainage Lines
concentration (ug/L)
1
0.1
0.01
0.001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
SW001
SW007
SW028
SW059
SW075
30 Day Average Rainfall


Graph G8 - Surface Water -Temporal Trend - Sum of PFOS + PFHxS
Closed Training Area
concentration (ug/L)
1
0.1
0.01
0.001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
SW086
SW091
SW123
30 Day Average Rainfall


Graph G9 - Sediment -Temporal Trend - PFOS + PFHxS
Base Drainage Lines
concentration (ug/L)
1
0.1
0.01
0.001
0.0001
30 day average daily rainfall (mm)
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
SD001
SD028
SD059
SD075
30 Day Average Rainfall


Graph G10 - Sediment -Temporal Trend - PFOS + PFHxS
Closed Training Area
concentration (ug/L)
30 day average daily rainfall (mm)
1
0.1
0.01
0.001
0.0001
40
35
30
25
20
15
10
5
0
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
SD086
SD091
SD123
30 Day Average Rainfall

Appendix E

Mann-Kendall Analysis

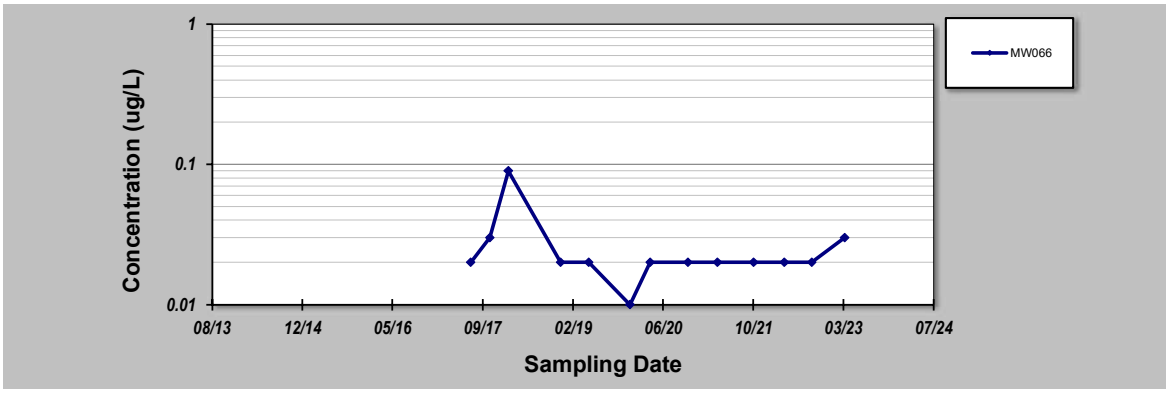
Appendix E Mann-Kendall Analysis

60612561
Mann-Kendall Statistical Analysis
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks
Ongoing Monitoring Interpretive Report
(November 2021 – March 2023)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	12-Sep-23	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFOA (Source Area 1)
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW066						
Sampling Event	Sampling Date	PFOA (SOURCE AREA 1) CONCENTRATION (ug/L)						
1	20-Mar-14							
2	1-Jun-16							
3	18-Jul-17	0.02						
4	20-Jul-17							
5	1-Nov-17	0.03						
6	12-Feb-18	0.09						
7	28-Nov-18	0.02						
8	3-May-19	0.02						
9	18-Dec-19	0.01						
10	7-Apr-20	0.02						
11	4-Nov-20	0.02						
12	16-Apr-21	0.02						
13	3-Nov-21	0.02						
14	21-Apr-22	0.02						
15	22-Apr-22							
16	20-Sep-22	0.02						
17	21-Mar-23	0.03						
18								
19								
20								
Coefficient of Variation:		0.76						
Mann-Kendall Statistic (S):		-3						
Confidence Factor:		54.8%						
Concentration Trend:		Stable						



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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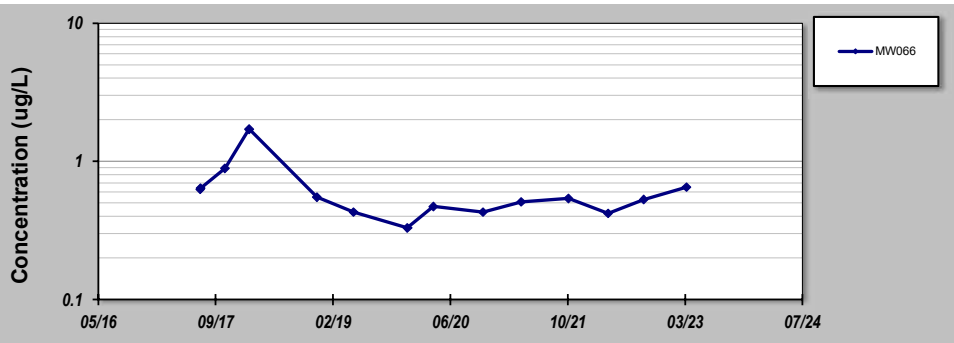
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Mann-Kendall Statistical Analysis
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks
Ongoing Monitoring Interpretive Report
(November 2021 – March 2023)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	12-Sep-23	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFHxS+PFOS (Source Area 1)
Conducted By:	[redacted]	Concentration Units:	ug/L
Sampling Point ID:	MW066		

Sampling Event	Sampling Date	PFHXS+PFOS (SOURCE AREA 1) CONCENTRATION (ug/L)
1	18-Jul-17	0.63
2	20-Jul-17	0.64
3	1-Nov-17	0.89
4	12-Feb-18	1.71
5	28-Nov-18	0.55
6	3-May-19	0.43
7	18-Dec-19	0.33
8	7-Apr-20	0.47
9	4-Nov-20	0.43
10	16-Apr-21	0.51
11	3-Nov-21	0.54
12	21-Apr-22	0.42
13	22-Apr-22	
14	20-Sep-22	0.53
15	21-Mar-23	0.65
16		
17		
18		
19		
20		
Coefficient of Variation:		0.55
Mann-Kendall Statistic (S):		-18
Confidence Factor:		82.1%
Concentration Trend:		Stable



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

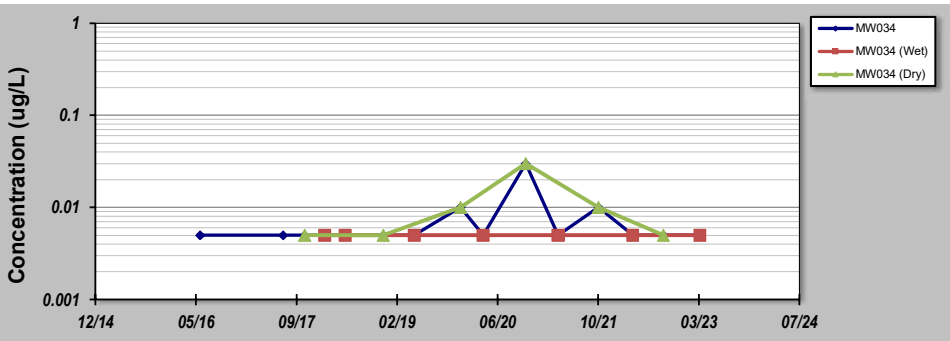
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PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks
Ongoing Monitoring Interpretive Report
(November 2021 – March 2023)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	12-Sep-23	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFOA (Northern Monitoring Wells)
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW034	MW034 (Wet)	MW034 (Dry)				
Sampling Event	Sampling Date	PFOA (NORTHERN MONITORING WELLS) CONCENTRATION (ug/L)						
1	1-Jun-16	0.005						
2	18-Jul-17	0.005						
3	2-Nov-17	0.005		0.005				
4	10-Feb-18	0.005	0.005					
5	23-May-18	0.005	0.005					
6	28-Nov-18	0.005		0.005				
7	1-May-19	0.005	0.005					
8	18-Dec-19	0.01		0.01				
9	7-Apr-20	0.005	0.005					
10	4-Nov-20	0.03		0.03				
11	15-Apr-21	0.005	0.005					
12	2-Nov-21	0.01		0.01				
13	21-Apr-22	0.005	0.005					
14	22-Apr-22							
15	20-Sep-22	0.005		0.005				
16	21-Mar-23	0.005	0.005					
17								
18								
19								
20								
Coefficient of Variation:		0.89	0.00	0.90				
Mann-Kendall Statistic (S):		12	0	3				
Confidence Factor:		70.4%	37.9%	64.0%				
Concentration Trend:		No Trend	Stable	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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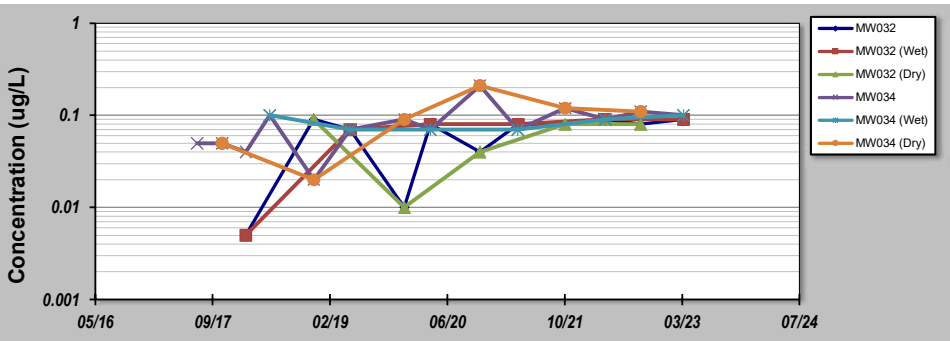
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Department of Defence - Robertson Barracks
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(November 2021 – March 2023)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	12-Sep-23	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFHxS+PFOS (Northern Monitoring Wells)
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW032	MW032 (Wet)	MW032 (Dry)	MW034	MW034 (Wet)	MW034 (Dry)
Sampling Event	Sampling Date	PFHXS+PFOS (NORTHERN MONITORING WELLS) CONCENTRATION (ug/L)					
1	18-Jul-17				0.05		
2	2-Nov-17				0.05		0.05
3	10-Feb-18	0.005	0.005		0.04		
4	23-May-18				0.10	0.10	
5	27-Nov-18	0.09		0.09			
6	28-Nov-18				0.02		0.02
7	1-May-19	0.07	0.07		0.07	0.07	
8	18-Dec-19	0.01		0.01	0.09		0.09
9	7-Apr-20	0.08	0.08		0.07	0.07	
10	4-Nov-20	0.04		0.04	0.21		0.21
11	15-Apr-21				0.07	0.07	
12	16-Apr-21	0.08	0.08				
13	2-Nov-21	0.08		0.08	0.12		0.12
14	20-Apr-22	0.09	0.09				
15	22-Apr-22				0.09	0.09	
16	20-Sep-22	0.08		0.08	0.11		0.11
17	21-Mar-23				0.10	0.10	
18	22-Mar-23	0.09	0.09				
19							
20							
Coefficient of Variation:		0.49	0.47	0.57	0.54	0.18	0.66
Mann-Kendall Statistic (S):		24	13	1	41	3	7
Confidence Factor:		96.4%	99.2%	50.0%	98.7%	64.0%	86.4%
Concentration Trend:		Increasing	Increasing	No Trend	Increasing	No Trend	No Trend



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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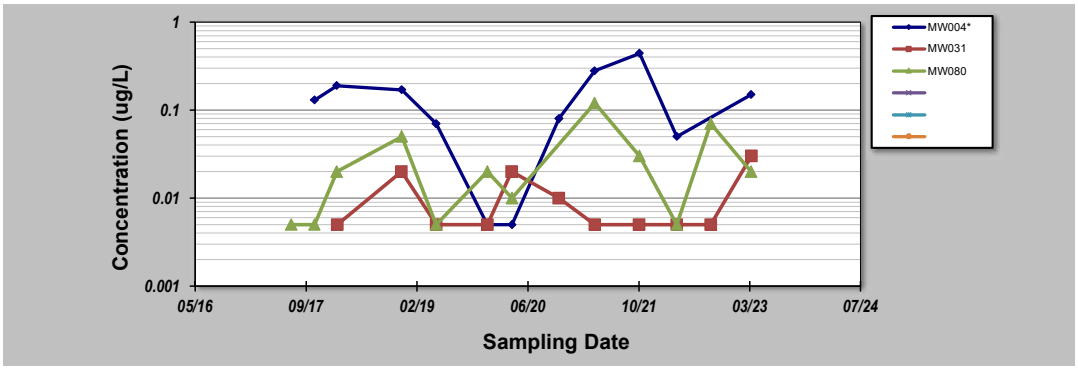
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PFAS Ongoing Monitoring Program
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Ongoing Monitoring Interpretive Report
(November 2021 – March 2023)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	12-Sep-23	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFHxS+PFOS (Source Zone 2 and 3)
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW004*	MW031	MW080				
Sampling Event	Sampling Date	PFHXS+PFOS (SOURCE ZONE 2 AND 3) CONCENTRATION (ug/L)						
1	18-Jul-17			0.005				
2	30-Oct-17	0.13		0.005				
3	8-Feb-18	0.19		0.02				
4	10-Feb-18		0.01					
5	27-Nov-18		0.02					
6	28-Nov-18	0.17		0.05				
7	1-May-19	0.07		0.005				
8	2-May-19		0.01					
9	18-Dec-19	0.005	0.005	0.02				
10	6-Apr-20		0.02					
11	7-Apr-20	0.005		0.01				
12	7-May-20							
13	4-Nov-20		0.01					
14	5-Nov-20	0.08						
15	15-Apr-21	0.28		0.12				
16	16-Apr-21		0.005					
17	2-Nov-21		0.005					
18	3-Nov-21	0.44		0.03				
19	20-Apr-22		0.005					
20	21-Apr-22	0.05		0.005				
21	20-Sep-22		0.005	0.07				
22	21-Mar-23	0.15		0.02				
23	22-Mar-23		0.03					
24								
25								
Coefficient of Variation:		0.90	0.84	1.16				
Mann-Kendall Statistic (S):		2	1	19				
Confidence Factor:		53.0%	50.0%	88.9%				
Concentration Trend:		No Trend	No Trend	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

* Results taken from MW005 as an alternate well to MW004

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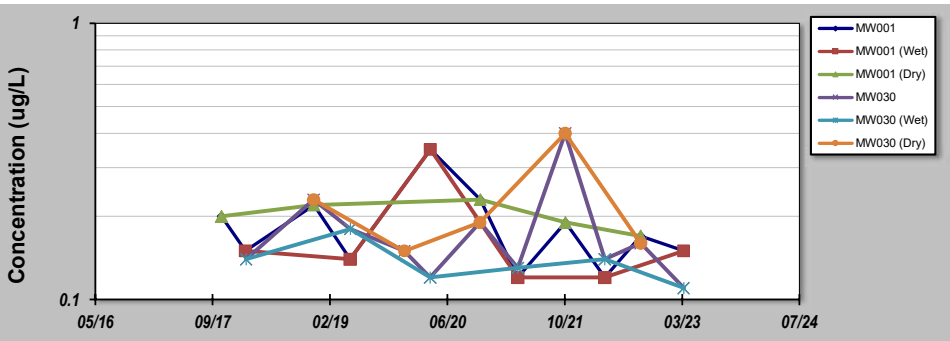
60612561
Mann-Kendall Statistical Analysis
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks
Ongoing Monitoring Interpretive Report
(November 2021 – March 2023)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	12-Sep-23	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFHxS+PFOS (Southern Monitoring Wells)
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW001	MW001 (Wet)	MW001 (Dry)	MW030	MW030 (Wet)	MW030 (Dry)

Sampling Event	Sampling Date	PFHXS+PFOS (SOUTHERN MONITORING WELLS) CONCENTRATION (ug/L)						
1	30-Oct-17	0.20		0.20				
2	8-Feb-18	0.15	0.15					
3	12-Feb-18				0.14	0.14		
4	27-Nov-18				0.23		0.23	
5	28-Nov-18	0.22		0.22				
6	1-May-19	0.14	0.14					
7	2-May-19				0.18	0.18		
8	18-Dec-19				0.15		0.15	
9	6-Apr-20				0.12	0.12		
10	7-Apr-20	0.35	0.35					
11	4-Nov-20				0.19		0.19	
12	5-Nov-20	0.23		0.23				
13	15-Apr-21	0.12	0.12		0.13	0.13		
14	2-Nov-21				0.4		0.4	
15	3-Nov-21	0.19		0.19				
16	20-Apr-22	0.12	0.12		0.14	0.14		
17	20-Sep-22	0.17		0.17	0.16		0.16	
18	22-Mar-23	0.15	0.15		0.11	0.11		
19								
20								
Coefficient of Variation:		0.36	0.52	0.12	0.46	0.18	0.45	
Mann-Kendall Statistic (S):		-13	-3	-4	-10	-6	0	
Confidence Factor:		82.1%	64.0%	75.8%	75.3%	81.5%	40.8%	
Concentration Trend:		Stable	Stable	Stable	Stable	Stable	Stable	



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