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

AECOM

Annual Interpretive Report 2021

PFAS OMP - Robertson Barracks

19-Oct-2022
PFAS Ongoing Monitoring Program NT & SA

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Prepared by

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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)[1] outlined in the PFAS Management Area Plan (PMAP) (Department of Defence, 2018) at Robertson Barracks (the Base), Northern Territory (NT).

The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, surface water and sediment originating from the Base. This monitoring program includes monitoring completed between November 2020 and April 2021. Sampling under these different climatic conditions provides a better understanding of the movement and concentrations of PFAS in the environment.

The OMP includes sampling and analysis from the Base, and also from a number of surrounding (off-Base) areas, which include the Close Training Area (CTA), Shoal Bay Receiving Station (SBRS), and other areas. The Base and these surrounding areas are collectively referred to as the 'Management Area' and were identified during a Detailed Site Investigation (DSI) in 2018 (Senversa, 2018a)[1] . The Management Area is shown on Figure A1, Appendix A.

Objectives

The overarching objective of implementing the OMP is to provide information on changes in the location and concentrations of PFAS in groundwater and surface water within the Management Area. The collected 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 Scope

The scope of the work in this report includes sampling rounds in November 2020 (groundwater sampling, targeting the end of dry season), December 2020 (surface water sampling targeting the start of wet season) and April 2021 (groundwater, surface water and sediment sampling targeting the end of the wet season), in general accordance with the Sampling and Analysis Quality Plan (SAQP) (AECOM, 2021), except as summarised in **Section 3.2** of this report. The November/December 2020 and April 2021 monitoring period comprised monitoring of 18 groundwater wells and seven co-located sediment and surface water locations on-Base and in surrounding off-Base areas. Groundwater elevation data was collected from 18 groundwater wells during the biannual monitoring events.

Interpretive Analysis

Data collected during the monitoring period were compared to historical data that has been collected since 2016 at the OMP sampling locations.

Groundwater Results

Groundwater Flow Direction

OMP results indicate groundwater is highest in the western portion of the Base and flows from that area in two main directions. In the north, groundwater moves to the northeast towards the CTA; and in the south, groundwater flows to the south towards the catchment of Milners Creek. This is generally consistent with previous investigations (Senversa, 2018a).

PFAS Concentrations

PFAS concentrations in groundwater at on-Base locations are stable in most locations with the exception of Source Areas 2 and 3 (Emergency Response Squadron parking area, and wash down bays and refuelling area, respectively), in which results from two monitoring locations show increased concentrations compared to previous monitoring events:

[1] Available at https://www.defence.gov.au/about/locations-property/pfas/pfas-management-sites/robertson-barracks

- Monitoring location MW004, within Source Area 2, recorded a new maximum sum of PFHxS and PFOS concentration of 0.28 µg/L.
- Monitoring location MW080, adjacent to Source Area 3, recorded a new exceedance of the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFHxS and PFOS, with a sum of PFHxS and PFOS concentration of 0.12 µg/L.

The observed increased PFAS concentrations from Source Areas 2 and 3, while notable, are not considered significant due to their proximity to the Source Areas, and do not change the overall risk profile of the Base. Concentrations will continue to be monitored at these locations and will be reassessed as part of the 2022 Ongoing Monitoring Interpretive Report.

What is an 'order of magnitude'?

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

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

PFAS concentrations are above the laboratory limit of reporting (LOR) in groundwater in two of the ten off-Base locations and are generally consistent with historical results. These results indicate there is no change in the overall risk profile of the Base. The groundwater monitoring results support the current management actions within the PMAP.

Surface Water Results

PFAS concentrations in surface water at on- and off-Base locations appear to be stable and in all cases were below the adopted PFAS Recreational Water guideline values (NHMRC, 2019). This suggests that the understanding of PFAS migration via surface water is unchanged and the results support the current management actions within the PMAP.

PFOS concentrations exceeding the 99% freshwater ecological guideline value were detected in all on- and off-Base locations that recorded PFAS concentrations greater than the LOR. Actual impacts on aquatic biota are not currently understood and utilisation of the 99% guideline value functions as a conservative approach to measuring ecological risk. Reported PFAS concentrations within on- and off-Base surface water sampling locations remain stable. As such, there is no change in the overall risk profile of the Base.

Sediment Results

PFAS concentrations in sediment at all on- and off-Base locations were within historical ranges and were mostly close to or below the LOR. This suggests that the understanding of PFAS migration in sediment is unchanged and the results support the current management actions within the PMAP.

What is a 'limit of reporting'?

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

CSM and Risk Profile

The DSI (Senversa, 2018a) and the Human Health and Ecological Risk Assessment (HHERA) (Senversa, 2018b) concluded that the risks associated with the majority of exposure pathways relating to PFAS originating from the Base to human health and ecological receptors were low and acceptable, with potentially elevated exposure scenarios identified for aquatic ecosystems from bioaccumulation and human consumption of recreationally caught fish and molluscs.

The conceptual site model (CSM) was reviewed in light of the new monitoring data collected in the monitoring period, and no changes were identified to sources, pathways or receptors at the Base or within the Management Area to change the risk profile, as described in the DSI (Senversa, 2018a).

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 Management Area.
- Based on the data collected during the monitoring period, no changes to the risk profile were identified within the Management 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, surface water and sediment/surface soil 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
ALS	ALS Environmental
BOM	Bureau of Meteorology
CSM	Conceptual Site Model
CTA	Close Training Area
Defence	Department of Defence
DENR	Department of Environment and Natural Resource
DoH	Department of Health
DSI	Detailed Site Investigation
HEPA	Heads of Environment Protection Authority
HHERA	Human Health and Ecological Risk Assessment
LOR	limit of reporting
ML	megalitres
MTR	Marksman Training Range
MW	monitoring well
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NATA	National Association of Testing Authorities
NT	Northern Territory
NSW	New South Wales
NEMP	National Environmental Management Plan
NMI	National Measurement Institute
OMP	Ongoing Monitoring Program
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFHxS	perfluorohexane sulfonate
PMAP	PFAS Management Area Plan
PWC	Power and Water Corporation
QA/QC	quality assurance and quality control
ROB	Robertson Barracks
SAQP	Sample and Analysis Quality Plan

Abbreviation/ Acronym	Term
SBRS	Shoal Bay Receiving Station
SD	sediment
SW	surface water
TDI	Tolerable Daily Intake
km	kilometre
m	metre
mbgl	metres below ground level
g	grams
EC	electrical conductivity
DO	dissolved oxygen
ORP	oxidation reduction potential
L	litres

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by the Department of Defence (Defence) to implement the Ongoing Monitoring Program (OMP) for monitoring of per- and poly-fluoroalkyl substances (PFAS) at Robertson Barracks (the Base), Northern Territory (NT).

The monitoring targeted PFAS and included selected locations on-Base (Robertson Barracks) and in surrounding off-Base areas, including the Close Training Area (CTA) and Shoal Bay Receiving Station (SBRS) which includes the Groundwater and Surface Water Monitoring Areas (herein referred to as the Monitoring Area) as identified in the PFAS Monitoring Area Plan (PMAP).

In order to meet the objectives of the OMP, the monitoring was undertaken in accordance with the *Sampling Analysis and Quality Plan* (SAQP) (AECOM, 2021). This report has been prepared in accordance with the Defence (2021) *OMP Annual Interpretive Report Guidance.* Directorate of PFAS Management Infrastructure Division. Version 0.3, November 2021.

1.1 Purpose and objectives

The objective of the monitoring program set out in the OMP is to continue to assess changes in the nature and extent of PFAS within the environment, where Defence's historical use of legacy aqueous film-forming foam (AFFF) has led to an identified potentially elevated risk to a receptor, or potential future risk to a receptor.

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
- an early warning that additional management of PFAS contamination may be warranted in areas not currently understood to be affected by PFAS.

The monitoring data will be evaluated to assess environmental variability and trends in PFAS concentrations and changes to the known risk profile, and to inform recommendations for triggers to review the OMP and PMAP (Department of Defence, 2018).

1.2 Scope

The scope of works for this interpretive report included assessing changes to the distribution of PFAS based on data collected over the preceding monitoring period (November 2020 – April 2021) to assess whether this changes the understanding of the conceptual site model (CSM) and the PFAS risk at the Base. This included the evaluation of data reported in the following interpretive and factual reports, as well as other data provided by Defence and ancillary external data sources:

- Interpretive Report 2020 – PFAS OMP Robertson Barracks (Department of Defence, 2020)
- Robertson Barracks – Sampling Event Factual Report, November and December 2020 (AECOM, 2021a)
- Robertson Barracks – Sampling Event Factual Report, April 2021 (AECOM, 2021b)
- Ancillary external meteorological data (see **Section 6.4**)

To complete this scope of work AECOM completed periodic groundwater, surface water and sediment monitoring between November 2020 and April 2021, in accordance with a Sampling and Analysis Quality Plan (SAQP) (AECOM, 2021), prepared by AECOM.

2.0 Site setting

2.1 Site identification

The following summarises the Base identification and setting presented in the PFAS Monitoring Area Plan (PMAP) (Department of Defence, 2018).

Table 1 Site identification and setting summary

Element	Description
Site ID	Robertson Barracks, Site number 1200
Location	Robertson Barracks is located approximately 17 km east of Darwin city centre. The area surrounding Robertson Barracks 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 Robertson Barracks as shown in **Figure A1** in **Appendix A**. The Monitoring Area comprises Robertson Barracks and 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. The Monitoring Area also includes a portion of the CTA to monitor potential lateral migration of PFAS impacted groundwater from Robertson Barracks and PFAS impacted surface water and sediment within Milners Creek and Milners Swamp within the CTA. Two groundwater abstraction bores used for potable purposes at the SBRS have also been included as part of this OMP. These two bores were also tested as part of the DSI as the SBRS is operated by Defence and are proposed to be included as part of ongoing monitoring despite no previous detections of PFAS.
Regional Climate	The Monitoring Area lies 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.
Topography, geology and hydrogeology	The Monitoring Area is situated in a semi-rural area surrounded by semi-rural residential land uses, with open wetland and swamp areas as well as multiple quarrying areas including within the CTA in the eastern section of the Monitoring Area. The Monitoring Area 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 (mAHD) in the northwest to 19 mAHD in the northeast. The surrounding area slopes to the northeast towards Shoal Bay. The Monitoring 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.

Element	Description
	• Wildman Siltstone Formation comprises siltstone, silty sandstone and minor quartzite encountered between 50 m to over 1,000 metres below ground level (mbgl). • Acacia Gap Quartzite Member comprises quartzite, commonly pyritic sandstone with interbedded siltstone. The geology encountered during the DSI across the Monitoring Area 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 Robertson Barracks, 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 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 10.194 mbgl 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 from monitoring wells installed within the lower table aquifer of the Bathurst Island Formation between 27 and 30 mbgl ranged between 1.445 and 7.283 mbgl indicating a semi-confined aquifer system. 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 Robertson Barracks is inferred to the east-northeast. Groundwater flow direction in the southern portion of Robertson Barracks is inferred to the south-southeast which is likely to be influenced by the southern drainage channel leading into Milners Creek. Groundwater hydraulic gradients across the Monitoring Area were generally consistent ranging between 0.0116 and 0.0138. Apart from some minor spatial and temporal variations, the hydraulic gradients reported for the wet season compared to the dry season were relatively similar. This suggests that groundwater recharge to the underlying aquifers are relatively uniform across the study area 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 Robertson Barracks and the CTA, groundwater is 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 Robertson Barracks, 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 rise almost to the ground surface within the CTA in proximity of Milners Creek as well as above the drainage lines in some areas within Robertson Barracks

Element	Description
	with groundwater and surface water both contributing to areas of high water flow and/or areas of inundation.
Surface Water	Robertson Barracks is located in the Kings Creek Catchment, which flows north out into Shoal Bay, located northeast of Darwin Harbour. Robertson Barracks is situated partly on a wetland area which extends to the west of the Barracks 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 Robertson Barracks 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 Robertson Barracks is predominantly inundated while the north-eastern area becomes inundated during high rainfall events. There are a number of lined and unlined drainage lines located within Robertson Barracks that generally follow the local topography and divert surface runoff through and off Robertson Barracks. Generally, surface water diverts around Robertson Barracks 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 Robertson Barracks discharge to the unlined southern drainage channel which is located outside of Robertson Barracks 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 Robertson Barracks 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 northeast 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 Monitoring Area includes both developed and undeveloped land areas that include fields, streams, wetlands, and forested areas.
Current and Previous land use	Robertson Barracks 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 on Robertson Barracks, with the addition of staff from the United States Marine Corp (USMC) during the dry season. The current layout and key features include: 1. Helicopter airfield and infrastructure in the northern portion of Robertson Barracks, including hangars, vehicle and aircraft maintenance areas, and fuel supply infrastructure. 2. Commercial/office buildings across Robertson Barracks. 3. 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 Robertson Barracks.

Element	Description
	4. Four main catering kitchens and recreational facilities, including gyms, swimming pools, children's play parks, cafes and a chapel. 5. Training areas, including shooting ranges and revetments in the cleared open space to the north of Robertson Barracks known as the MTR. 6. The CTA which is a former quarry area to the east of Robertson Barracks 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 general public who can currently access some areas of the CTA. 7. Sports fields, ovals and activity areas located along the south eastern section of Robertson Barracks. The surrounding land use is predominantly Commonwealth owned, with no privately-owned rural residential homes within a 1 km radius of Robertson Barracks. Identified land uses in each direction from Robertson Barracks are summarised below. **North:** Shoal Bay Receiving Station (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 Site and the Monitoring Area is shown in **Figure A1** (**Appendix A**). The Monitoring Area comprises of Robertson Barracks and the south western portion of the CTA. Two wells are located to the north of the Barracks at SBRS; however, these are outside of the Monitoring Area.

2.3 Source areas

The PMAP (Department of Defence, 2018) identifies the following locations as PFAS source areas, illustrated in **Figure A1** (**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 BDE Elements where the ERS parked their trucks prior to moving to Building 137; and

- Source area 3: Wash down bays and refuelling within the southern portion of Roberson Barracks. The drainage network also culminates in this area of Robertson Barracks.

3.0 Sampling and analytical scope and methodology

3.1 Sampling and analysis methodology

The SAQP (AECOM, 2021) (**Appendix D**) provides the sampling schedule and rationale, prescribing biannual groundwater sampling, biannual surface water sampling, and annual sediment sampling, during this reporting period. This involved:

- A broad sampling and analysis event for the collection of groundwater 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).

3.1.1 Summary of OMP works 2020 to 2021

3.1.1.1 November and December 2020 biannual event (AECOM, 2021a)

- Groundwater monitoring works were undertaken in November 2020 and surface water monitoring works were undertaken in December 2020 comprising of:
  - Sampling of groundwater at 16 of a planned 18 monitoring wells
  - Sampling of surface water at seven of a planned nine locations
  - Analysis of samples for the extended PFAS suite
  - Analysis of 20% of samples for additional geochemical parameters.

3.1.1.2 April 2021 biannual/annual sampling event (AECOM, 2021b)

- Monitoring works were undertaken in April 2021 and comprised of
  - Sampling of groundwater at 18 monitoring wells
  - Sampling of surface water at seven of a planned nine locations
  - Sampling of sediment at nine locations

3.2 Deviations from the OMP

The works undertaken over the 12-month monitoring period were completed in general accordance with the SAQP (AECOM, 2021). Sampling deviated from the OMP and/or SAQP (AECOM, 2021) at some locations and such deviations are identified in the associated Sampling Event Factual Reports presented in **Appendix E** and summarised below.

- Non-PFAS analytes have been removed from the OMP program as requested by Defence and were implemented prior to the April 2021 event and finalisation of a revised SAQP. 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”.
- It should be noted that non-PFAS analytes were included in the program as a contractual requirement but are not a requirement of the PMAP (Department of Defence, 2018).

Deviations from the OMP and/or SAQP are summarised in **Table 2** and **Table 3** below.

November/December 2020

Table 2 Deviations from the SAQP/OMP during November/December 2020 sampling event

Item	November/December 2020 sampling event
Access to sampling locations	The following were accessed and able to be sampled: • 16 out of 18 monitoring wells • 7 out of 9 surface water locations Monitoring well MW023 and MW080 were dry. Surface water locations SW023 and SW028 were dry. The non-sampling of these locations is generally not considered critical to understanding the distribution of PFAS in groundwater and surface water in the Management Area. However, it is noted MW023 has been observed dry four out of the five monitoring rounds conducted since November 2018, including the interim monitoring events (Senversa, 2019a; Senversa, 2019b), and PFAS OMP monitoring events (AECOM, 2021a; AECOM, 2021b). Overall, the 2019 to 2020 monitoring periods have been characterised by warm and dry conditions for a sustained period. MW023 is located down the inferred hydraulic downgradient from Source Area 1, historically this well has not reported a PFAS concentration above laboratory detection limits. Continued non-sampling at MW023 may result in a lack of understanding of PFAS concentrations migrating down gradient of Source Area 1, that may enter sensitive receptors, namely Milners Swamp and low-lying areas (in the northeast) where groundwater may seep into surface water. Consideration of an alternative sample location (such as MW024) should be considered if MW023 continues to be observed dry.

April 2021

Table 3 Deviations from the SAQP/OMP during April 2021 sampling event

SAQP	April 2021 sampling event
Nine surface water (on-base) locations are identified to be sampled as part of the start of the sampling event.	Monitoring locations SW028 and SW023 were dry and were not sampled.
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 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. The change to the sampling methodology is not considered to have a material impact on the monitoring results or interpretation.
Sampling of groundwater and surface water for the non-PFAS suite in February 2021	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”.

3.3 Changes to the monitoring network

There were no changes to the monitoring network condition or access.

4.0 Quality assurance and quality control

Data validation reporting completed as part of the November and December 2020, and April 2021 monitoring events (AECOM, 2021a) (AECOM, 2021b) is included in each factual report and can be found in **Appendix E**. Key findings from the data validation were as follows:

4.1 November and December 2020

Groundwater

- The elevated RPD for Sum of perfluorooctane sulfonate (PFOS) + perfluorohexane sulfonate (PFHxS) should be taken into consideration when reporting results that lie close to the guidelines.
  - Monitoring wells MW004, QC201 and MW030 and MW032 had sum of PFOS + PFHxS concentrations close to the guideline of 0.07 µg/L; however, these results are within the expected Sum of PFOS + PFHxS concentration ranges for these locations.

Surface water

- Holding time exceedances should be taken into consideration when interpreting results for pH and dissolved major cations quantitatively.
  - As these analytes are not considered a contaminant of potential concern (COPC) for these samples, the potential for under or over reporting is not considered to materially affect the interpretation of results; however, this should be taken into consideration when using the data for interpretive purposes.
- The elevated laboratory duplicate RPD should be taken into consideration when interpreting results for bicarbonate alkalinity as $CaCO_3$ and total alkalinity as $CaCO_3$ quantitatively.
  - As these analytes are not considered a contaminant of potential concern (COPC) for these samples, the potential for under or over reporting is not considered to materially affect the interpretation of results; however, the elevated RPD should be taken into consideration when using the data for interpretive purposes.

4.2 April 2021

Groundwater

- Elevated RPDs should be taken into consideration when using data for Sum of PFAS quantitatively.
  - Sum of PFAS values are not utilised for statistical or analytical purposes.
- Elevated RPDs should be taken into consideration when using data for PFOS and Sum of PFOS + PFHxS where close to the guidelines.
  - Monitoring wells MW032 and MW034 had Sum of PFHxS and PFOS concentrations close to the guideline of 0.07 µg/L, however, these results are within the expected Sum of PFHxS and PFOS concentration ranges for these locations.

Surface Water

- The surface water analytical results can be used as a basis for interpretation.

Sediment

- The sediment analytical data can be used as a basis for interpretation.

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, 2019) Annex L requirements.

5.0 Adopted screening criteria

The selection of screening criteria references national guidance in the form of the PFAS National Environmental Management Plan (NEMP) (HEPA, 2020), Defence estate and environmental strategies, and Defence PFAS-specific strategies and guidance. At the time of preparing this report, a number of guidance documents were in circulation in Australia including:

- PFAS National Environmental Management Plan (version 2.0) (NEMP) (HEPA, 2020).
- Department of Health, 2019. *Health Based Guidance Values for PFAS for use in site investigations in Australia*. April 2017 (Department of Health, 2019).
- National Health and Medical Research Council (NHMRC), 2019. *Guidance on PFAS in Recreational Water*. August 2019 (NHMRC, 2019).
- Food Standards Australia New Zealand (FSANZ), 2017, Perfluorinated Chemicals in Food (FSANZ, 2017)
- *National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B1* (ASC NEPM, 2013).

The PFAS screening criteria adopted to assess the data generated from the monitoring are presented in **Table 4** and **Table 5** and are based on criteria outlined in the Detailed Site Investigations (DSI) (Senversa, 2018a), Human Health and Ecological Risk Assessments (Senversa, 2018b) and being carried through Interim and Factual reporting to date.

Table 4 Summary of adopted screening criteria: surface water and groundwater human health

Pathway	Compound	Criteria	Comment / Reference
Drinking water – groundwater	PFOS + PFHxS	0.07 µg/L	The values presented in the PFAS NEMP, 2020 are from DoH 2019, which published final health-based guidance values for PFAS for use in site investigations in Australia.
	Perfluorooctanoic acid (PFOA)	0.56 µg/L	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	The values presented in the PFAS NEMP, 2020 are from NHMRC 2019, which published final health-based guidance values for PFAS for use in site investigations in Australia.
	PFOA	10 µg/L	

PFOS + PFHxS: perfluorooctane sulfonate and perfluorohexane sulfonate
PFOA: perfluorooctanoic acid

Table 5 Summary of adopted screening criteria: surface water and groundwater ecological

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

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. The laboratory PFOS limit of reporting (LOR) adopted is this report is 0.001 µg/L.

No screening criteria has been applied for sediment samples collected within the Monitoring Area. However, the Human Health and Ecological Risk Assessment (HHERA) (Senversa, 2018b) utilises the PFAS NEMP (Department of Health, 2019) guideline for Public Open Space for sediment and can be utilised for reference purposes. PFAS NEMP sediment guidelines are presented in **Table 6** below.

Table 6 Summary of adopted screening criteria: sediment

Classification	Compound	Criteria	Comment
Industrial / Commercial sediment	PFOS and PFOS + PFHxS	20 mg/kg	Sediment criteria are sourced from the PFAS NEMP for consistency with those adopted for previous monitoring (Senversa, 2019a) and to provide some context for the magnitude of reported sediment concentrations.
	PFOA	50 mg/kg	
Public open space	PFOS and PFOS + PFHxS	1 mg/kg	
	PFOA	10 mg/kg	
Residential accessible soil	PFOS and PFOS + PFHxS	0.01 mg/kg	
	PFOA	0.1 mg/kg	
Residential minimal soil access	PFOS and PFOS + PFHxS	2 mg/kg	
	PFOA	20 mg/kg	

6.0 Contextual and ancillary information

6.1 Additional analytical data

Groundwater monitoring has been conducted on-Base in association with ongoing and previous investigations that include OMP monitoring, interim-OMP monitoring, and data collected as part of investigative studies such as the DSI (Senversa, 2018a). Analytical results from OMP and previous sampling events are presented in **Appendix B** Additional data is piecemeal and measured at a limited number of locations and/or or events. Historical data will be evaluated for its usability and applicability on a case-by-case basis, where some locations have sufficient data sets to apply to statistical trends, and other locations may not. Timing of historical data collection will also be factored into determining usability when comparing to data collected under the OMP.

6.2 Remediation projects

AECOM is not aware of any remediation projects being completed at the Base.

6.3 Infrastructure projects

Some development and refurbishment works 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 Climate

Climactic data for the region was extracted from the Darwin Airport (Station 014015), located within the Base (Bureau of Meteorology [BOM], 2021). The 2021 monitoring period was characterised by a period of hot, humid and wet summer (between November and April) and a hot and dry winter (between May and October).

Monthly maximum temperature for January 2019 through May 2021 exhibited generally higher than average temperatures compared to the mean monthly maximum temperature as presented in **Plate 1** below.

Total rainfall for the 2020/21 reporting period was calculated as 2,197.6 mm, which is greater than the mean annual rainfall of 1723.1 mm (BOM, 2021). Rainfall recorded during December 2020 and January 2021 was significantly higher than the average for those months. Monthly rainfall for January 2018 through May 2021 compared to mean monthly rainfall is presented in **Plate 2** below.

Under normal climatic conditions, November is generally considered a transitional period between the wet and dry season. 2020 had higher volumes of precipitation leading up to the November event, which may influence groundwater conditions. However, when compared to previous late dry season well gauging data, groundwater elevations appear to be within the expected range for late dry conditions. The impact on data quality and representativeness is likely to be negligible.

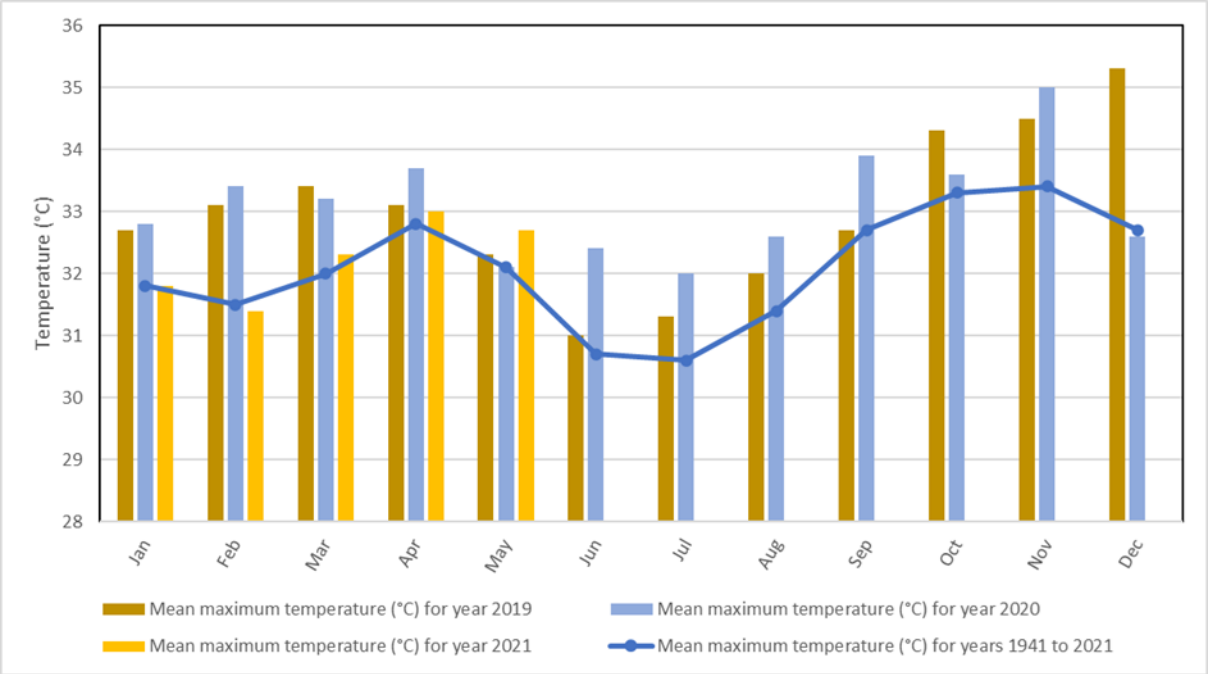

Plate 1 Temperature data 2018-2021 and mean monthly temperature for Darwin Airport (Station 014015) (BOM, 2021)

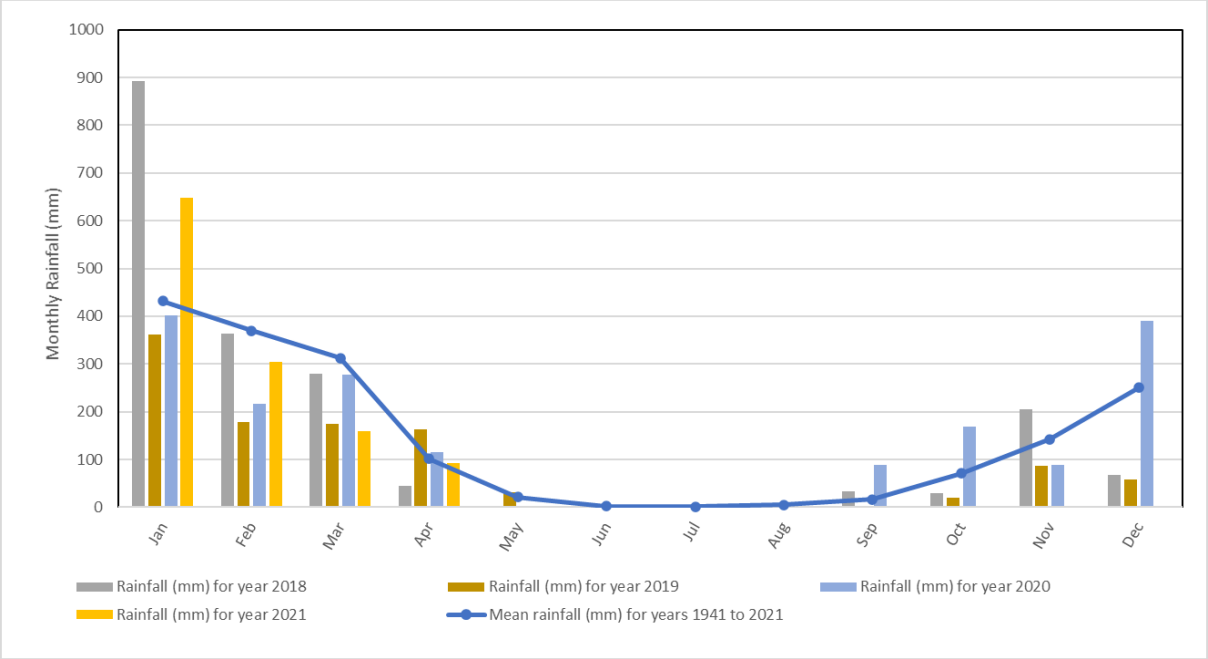

Plate 2 Rainfall data 2018-2021 and mean monthly rainfall for Darwin Airport (Station 014015) (BOM, 2021)

7.0 Monitoring events summary

7.1 Groundwater

7.1.1 Groundwater elevation and flow direction

The 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.

Groundwater elevations and interpreted contours for both events, presented in **Figure A2.1** and **Figure A2.2**, (**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 towards the southern end of the Base towards the catchment of Milners Creek in the southern portion of the Base. This is generally consistent with previous investigations (Senversa, 2018a).

7.1.2 Groundwater quality parameter field measurements results

During each sampling event, groundwater quality parameter field measurements were recorded prior to collecting groundwater samples. Parameters are presented in **Table T1** (**Appendix B**). The field parameter readings from the April 2021 sampling event are provided below and are considered consistent with previous investigations (Department of Defence, 2020) where sufficient data exists to evaluate parameter consistency.

- Dissolved Oxygen (DO) ranged between 0.14 mg/L (MW004) and 2.13mg/L (MW112)
- Total Dissolved Solids (TDS) estimated from field-measured electrical conductivity ranged from approximately 18.9 mg/L (MW032) and 529 mg/L (MW004) indicating a broad range of salinity.
- Field pH values recorded ranged from 5.1 (MW066) to 6.88 (MW112) indicating near neutral to slightly acidic conditions.
- Reduction-Oxidation Potential corrected in-field values measured between 44.6mV (MW004) and 418.3mV (MW066) indicating oxidising conditions.

7.1.3 Groundwater PFAS analytical results

All PFAS groundwater analytical results for each sampling event conducted in 2020/21 are presented in **Table T2** (**Appendix B**). Monitoring locations are presented in **Figure A3** (**Appendix A**) and the SAQP (AECOM, 2021) (**Appendix D)** and Sum of PFOS and PFHxS concentration maps are presented in **Figure A4.1** and **Figure A4.2** in **Appendix A**.

Groundwater monitoring analytical results for both on- and off-base wells for PFOS, PFOA and Sum PFOS and PFHxS are summarised in **Table 7** below. **Section 8.2** summarises the analytical groundwater results for the monitoring of source areas and downgradient and, cross gradient plume monitoring.

Table 7 Summary of PFOS, PFOA and Sum of PFOS and PFHxS concentrations in groundwater

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (µg/L)	No. of sample locations with concentrations > LOR	No. of sample locations exceeding groundwater drinking water guideline (HEPA, 2020)
November 2020	7 out of 8 (one location dry)	PFOS	0.08 (MW004) to 0.34 (MW066)	4	4
		PFOA	0.02 (MW066) to 0.03 (MW034)	2	0
		PFOS+PFHxS	0.08 (MW004) to 0.43 (MW066)	4	4
April 2021	8	PFOS	0.04 (MW034) to 0.39 (MW066)	5	4
		PFOA	0.02 (MW066)	1	0
		PFOS+PFHxS	0.07 (MW034) to 0.51 (MW066)	5	5
November 2020	9 out of 10 (one location was dry)	PFOS	0.01 (MW031) to 0.14 (MW030)	3	1
		PFOA	All locations <LOR	0	0
		PFOS+PFHxS	0.01 (MW031) to 0.19 (MW030)	3	1
April 2021	10	PFOS	0.05 (MW032) to 0.09 (MW030)	2	1
		PFOA	All locations <LOR	0	0
		PFOS+PFHxS	0.08 (MW032) to 0.13 (MW030)	2	2

NA = Not applicable (no applicable guideline)

Charts of groundwater concentrations of PFOS and PFHxS over time have been prepared for OMP sampling locations with sufficient data for meaningful presentation. No chart has been produced where there is insufficient data or data below LOR has been reported, such in the case of PFOA for most locations. Monitoring location MW066 has sufficient data to produce a chart for PFOA concentrations, however, as concentrations have been consistently below guideline values and near the LOR, similarly, no chart has been produced. Charts are presented in **Appendix C**, for the monitoring locations listed in **Table 6**.

Table 8 Charts of CoPC concentrations over time for groundwater monitoring locations

Chart ID	Monitoring Area	Groundwater monitoring well ID
1A	Source Zone 1	MW066
1B	Northern bores	MW032 and MW034
1C	Source Zone 2	MW004, MW031 and MW080
1D	Southern bores	MW001 and MW030

7.1.4 Groundwater non-PFAS analytical results

In addition to PFAS, selected groundwater samples were analysed for the following geochemical properties:

- Major ions (sodium, calcium, magnesium and potassium) and anions (chlorine, sulphate, bicarbonate, carbonate)
- Total Suspended Solids (TSS); and
- Dissolved Organic Carbon (DOC).

All non-PFAS groundwater analytical results for the sampling event conducted in 2020 is presented in **Table T3 (Appendix B)**. Monitoring locations are presented in **Figure A3 (Appendix A)** and the SAQP (AECOM, 2021) **(Appendix D).**

Results for major ions for monitoring events in November 2020 indicate that the cation composition is dominated by sodium in on-Base wells, and sodium and calcium in the Shoal Bay Receiving Station bores. The anion composition is dominated by bicarbonate in both on-Base and off-Base groundwater monitoring locations.

It should be noted that non-PFAS sampling parameters were removed from the OMP program by direction from Defence as of 27 January 2021 and therefore are not reported on during the April 2021 sampling event.

7.2 Surface water

7.2.1 Water quality parameter field measurements

Surface water quality parameter field measurements were recorded at the time of collecting samples. Parameters are presented in **Table T4** (**Appendix B**).

The stabilised readings from the most recent sampling event, in April 2021, are provided below. These results are considered generally consistent with previous investigations (Department of Defence, 2020) where sufficient data exists to evaluate parameter consistency.

- Dissolved Oxygen (DO) ranged between 3.64 mg/L (SW123) and 6.8 mg/L (SW007)
- Total Dissolved Solids (TDS) calculated from field-measured electrical conductivity ranged from approximately 12.4 mg/L (SW123) and 36.3 mg/L (SW001)
- Field pH values recorded ranged from 5.3 (SW086) to 7.9 (SW091) indicating slightly acidic to near neutral conditions. Surface water sampling locations SW007 located in the southwest corner of the Base, SW075 located in Milners Creek south of the southeast corner of the base, and SW086 located in Milners Creek within the CTA recorded lower pH values than from previous sampling events. Surface water sampling location SW091 downgradient of the above surface water locations recorded a PH value of 7.9, indicating more neutral conditions downgradient. No observations were recorded that would indicate a reason for the lower pH recorded pH values.
- Reduction-Oxidation Potential corrected in-field values measured between 270.1 mV (SW091) and 408.8 mV (SW007)
- Temperature measured in surface water within the Monitoring Area ranged between 28.5 ^{o}C (SW091) and 35.0 ^{o}C (SW059).

7.2.2 Surface water PFAS analytical results

All surface water analytical results for each sampling event conducted in 2020/21 are presented in **Table T5** (**Appendix B**). Monitoring locations are presented in **Figure A3** (**Appendix A**) and in the SAQP (AECOM, 2021) (**Appendix D**) and Sum of PFOS and PFHxS concentration maps are presented in **Figure A5.1 to A5.2** in **Appendix A**.

Surface water monitoring analytical results for both on- and off-base for PFOS, PFOA and Sum PFOS and PFHxS are summarised in **Table 9** below. **Section 8.3** summarises the analytical surface water results for the monitoring of source areas and downgradient areas.

Table 9 Summary of PFOS, PFOA and Sum of PFOS and PFHxS concentrations in surface water

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (µg/L)	No. of sample locations with concentrations > LOR	No. of sample locations exceeding recreational water guideline (HEPA, 2020)	No. of sample locations* exceeding freshwater 99% species protection guideline (HEPA, 2020)
December 2020	3 out of 5 (2 locations were dry)	PFOS	0.01 (SW059) to 0.03 (SW001)	2	NA	2
		PFOA	All locations <LOR	0	0	0
		PFOS+PFHxS	0.01 (SW059) to 0.03 (SW001)	2	0	NA
April 2021	3 out of 5 (2 locations were dry)	PFOS	0.02 (SW001) to 0.03 (SW059)	2	NA	2
		PFOA	All locations <LOR	0	0	0
		PFOS+PFHxS	0.02 (SW001) to 0.05 (SW059)	2	0	NA
December 2020	4	PFOS	0.01 (SW075) to 0.04 (SW091)	3	NA	3
		PFOA	All locations <LOR	0	0	0
		PFOS+PFHxS	0.01 (SW075) to 0.04 (SW091)	3	0	NA
April 2021	4	PFOS	0.01 (SW086 and SW091) to 0.02 (SW075 and SW123)	4	NA	4
		PFOA	All locations <LOR	0	0	0
		PFOS+PFHxS	0.01 (SW086 and SW091) to 0.02 (SW075 and SW123)	4	0	NA

***** 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.
NA = Not applicable (no applicable guideline)

Charts of surface water concentrations of PFOS and PFHxS over time have been prepared for OMP locations with sufficient data for meaningful presentation. Where insufficient data or data below LOR has been reported, such in the case of PFOA for all locations, a graph has not been created. Charts are presented in **Appendix C**, for the locations listed in **Table 8**.

Table 10 Charts of CoPC concentrations over time for surface water locations

Chart ID	Monitoring Area	Surface water monitoring location ID
2A	On-Base	SW001, SW028, SW059 and SW075
2B	Off-Base	SW086, SW091 and SW123

In addition to PFAS, selected surface water samples were analysed for the following geochemical properties:

- Major ions (sodium, calcium, magnesium and potassium) and anions (chlorine, sulphate, bicarbonate, carbonate)
- Total Suspended Solids (TSS); and
- Dissolved Organic Carbon (DOC).

These results are presented in the OMP Factual Reports and Interim Monitoring Reports in **Appendix E.** It should be noted that as directed by Defence, non-PFAS sampling parameters were removed from the OMP program as of 27 January 2021.

7.2.3 Surface water non-PFAS analytical results

In addition to PFAS, selected groundwater samples were analysed for the following geochemical properties:

- Major ions (sodium, calcium, magnesium and potassium) and anions (chlorine, sulphate, bicarbonate, carbonate)
- Total Suspended Solids (TSS); and
- Dissolved Organic Carbon (DOC).

All non-PFAS surface water analytical results for the sampling event conducted in 2020 is presented in **Table T6 (Appendix B)**. Monitoring locations are presented in **Figure A3 (Appendix A)** and the SAQP (AECOM, 2021) **(Appendix D)**.

Results for major ions for monitoring events in November 2020 indicate that the cation composition is dominated by sodium, and anion composition is dominated by bicarbonate in all surface water sampling locations.

It should be noted that non-PFAS sampling parameters were removed from the OMP program by direction from Defence as of 27 January 2021 and therefore are not reported on during the April 2021 sampling event.

7.3 Sediment

7.3.1 Sediment PFAS Analytical Results

All sediment analytical results for each sampling event conducted in April 2021 are presented in in **Table T7** (**Appendix B**). Monitoring locations are presented in **Figure A3** (**Appendix A**) and in the SAQP (AECOM, 2021) (**Appendix D**) and a Sum of PFHxS+PFOS concentration map is presented in **Figure A6** in **Appendix A**.

Sediment monitoring analytical results for both on- and off-Base for PFOS, PFOA and Sum PFOS and PFHxS are summarised in **Table 11** below. **Section 8.4** summarises the analytical sediment results for the monitoring of source areas and downgradient areas.

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

Sampling event	No. of sample locations analysed	Compound	Concentration range (> LOR) (mg/kg)	No. of sample locations with concentrations > LOR
April 2021	5	PFOS	0.0005 (SD028)	1
		PFOA	All locations <LOR	0
		PFOS+PFHxS	0.0005 (SD028)	1
April 2021	4	PFOS	All locations <LOR	0
		PFOA	All locations <LOR	0
		PFOS+PFHxS	All locations <LOR	0

NA = Not applicable (no applicable guideline)

Charts of sediment concentrations of PFOS and PFHxS over time have been prepared for locations with sufficient data for meaningful presentation. Where insufficient data or data below LOR has been reported, such in the case of PFOA for all locations, no chart has been created. Charts are displayed graphically in **Appendix C**, for the following locations:

Table 12 Charts of CoPC concentrations over time for sediment sampling locations

Chart ID	Monitoring Area	Sediment monitoring location ID
3A.1	On-Base	SD001, SD028, SD059, and SD075
3A.2	CTA	SD086, SD091 and SD123

8.0 Discussion/interpretive analysis

In addition to the 2020/2021 OMP data, historical data from 2018 and 2019 was included in the assessment to analyse temporal trends, and the site setting as outlined in **Section 2.0** was considered with regards to interpretation of the results. The historical data was obtained from the following reports:

- Robertson Barracks Detailed Site Investigation Report– PFAS (Senversa, 2018a);
- Robertson Barracks Human Health Risk Assessment (Senversa, 2018b);
- Robertson Barracks PFAS Management Area Plan (Department of Defence, 2018); and
- Roberson Barracks Interpretive Report, 2020 (Department of Defence, 2020).

8.1 Hydrogeology

The standing water levels (SWLs) were measured in the groundwater monitoring wells biannually to evaluate the groundwater elevations (to m AHD). Depth to groundwater measurements and the inferred potentiometric contours for the Monitoring Area are presented in **Figure A2.1** and **Figure A2.2** (**Appendix A**) and in the factual reports in **Appendix E**.

Inferred groundwater flow directions in the upper aquifer during the monitoring events in 2020/2021 appear to be consistent with the flow presented in previous investigations, with groundwater flowing northeast from the Base towards Milners Creek and Shoal Bay.

8.2 Groundwater results

A comparison of Sum of PFOS and PFHxS in groundwater to the assessment criteria is presented in **Figure A4.1** and **Figure A4.2** in **Appendix A**. The highest PFAS concentrations recorded between November 2020 and April 2021 were detected at Source Area 1. The maximum concentrations of PFHxS+PFOS recorded during the monitoring period were as follows:

- MW066 (Source Area 1): 0.43 µg/L (November 2020)
- MW066 (Source Area 1): 0.51 µg/L (April 2021)

PFOS or PFHxS concentrations were detected in monitoring wells down-hydraulic gradient from the identified PFAS source areas listed above and suggest that the groundwater impacts are associated with these areas. Reported concentrations of Sum of PFOS and PFHxS exceeded previous maximum concentrations at MW034 during the November 2020 sampling event, and MW004 and MW080 during the April 2021 sampling event. In general, PFAS concentrations were higher onsite in the vicinity of known source areas, and lower in downgradient locations. The reported concentrations from each sampling event included in this reporting period are further discussed in the sections below.

There were no first-time detections or new exceedances reported at the downgradient wells (MW018, MW021, MW021D, MW023, MW031 and MW032). The plume extent remain generally similar to that presented in the 2018 DSI (Senversa, 2018a).

8.2.1 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. These 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 PFOA and Sum of PFOS and PFHxS in the vicinity of Source Area 1 are presented in **Table T2** (**Appendix B**) and graphically in **Graph 1A** (**Appendix C**). Due to a majority of wells in the vicinity of Source Area 1 having PFAS concentrations below the LOR, graphical representation is presented for well MW066 only.

Analytical results are summarised in **Table 13** below. All up- and down-gradient monitoring locations reported PFAS concentration below laboratory detection limits during the reporting period.

Well MW066, located in the source area, recorded concentrations above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFHxS and PFOS (as has been the case since 2017). Results for MW066 fell within the range of historical concentrations.

Sum of PFOS and PFHxS, and PFOA concentrations at monitoring location MW066 increased between the December 2019 and the November 2020 monitoring events. While this change is noted, it is not considered significant as PFOA concentrations are near the LOR and significantly lower than guideline values, PFOS and PFHxS concentrations do not exhibit a notable change between the April 2020 event and the April 2021 event, and concentrations remain below the historical high of 1.44 µg/L recorded in 2018.

Statistical analysis could only be conducted for MW066, as the other Source Area 1 wells results are below the LOR for all events with the exception of MW021D, which had a single detection in February 2018.

A non-parametric MK statistical trend analysis was performed using the Interim and Ongoing Monitoring data for MW066 only. The MK statistical trends analysis indicates that monitoring location MW066 exhibits a potentially stable trend. Statistical analysis results are summarised in **Table 14** below.

Table 13 Source Zone 1 PFAS Summary Results (µg/L)

Well ID	Analyte	Historical range		Interim monitoring		OMP monitoring			
		Min	Max	Nov-18	May-19	Dec-19	Apr-20	Nov-20	Apr-21
MW066	PFOS+ PFHxS	0.62	1.44	0.55	0.43	0.33	0.47	0.43	0.51
	PFOA	ND	ND	0.02	0.02	0.01	0.02	0.02	0.02
MW012	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW012D	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW021	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW021D	PFOS+ PFHxS	ND	0.02	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected above laboratory limits of reporting

Table 14 Source Zone 1 Sum of PFOS and PFHxS statistical analysis results

Well ID	Trend	Confidence Factor
MW066	Stable	39.3%
MW012	Not evaluated	Not evaluated
MW012D	Not evaluated	Not evaluated
MW021	Not evaluated	Not evaluated
MW021D	Not evaluated	Not evaluated

8.2.2 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. These are summarised as:

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

Historical concentrations of PFOA and Sum of PFOS and PFHxS in groundwater sampled from the northern monitoring wells are presented in **Table T2** (**Appendix B**) and graphically in **Graph 1B** (**Appendix C**). Graphical representation is presented for wells MW032 and MW034 only.

Monitoring locations MW032 and MW034 recorded concentrations above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFHxS and PFOS at least once during the monitoring period. Analytical results are summarised in **Table 15** below.

Statistical analysis was not conducted for MW023 as the results from this location are below the LOR for all events.

Monitoring locations MW032 and MW034 do not exhibit a notable change in Sum of PFOS and PFHxS or PFOA concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event. MW034 had a Sum of PFOS and PFHxS concentration of 0.21 µg/L in November 2020 (the highest concentration recorded at this location to date), which does indicate an increase when compared to December 2019. However, the Sum of PFOS and PFHxS concentration at this location returned to 0.07 µg/L in April 2021. Similarly, monitoring location MW032 exhibited an increase when comparing results from the December 2019 sampling event and the November 2020 sampling event. There is currently insufficient data to determine if there are emerging trends in this area.

A non-parametric MK statistical trend analysis was performed using the Interim and Ongoing Monitoring data for monitoring locations MW032 and MW034. The MK statistical trends analysis indicates that the MW032 exhibits a potentially stable trend, and MW034 potentially exhibits no trend. It should be noted that if a location or locations begin to exhibit evidence of seasonally dependent trends future MK analysis may need to be conducted separately by season. Statistical analysis results are summarised in Table 16 below.

Table 15 Northern monitoring wells PFAS summary results (µg/L)

Well ID	Analyte	Historical range		Interim monitoring		OMP monitoring			
		Min	Max	Nov-18	May-19	Dec-19	Apr-20	Nov-20	Apr-21
MW032	PFOS+PFHxS	0.01	0.09	0.09	0.07	0.01	0.08	0.04	0.08
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW034	PFOS+PFHxS	0.03	0.21	0.02	0.07	0.09	0.07	0.21	0.07
	PFOA	ND	0.03	ND	ND	0.01	ND	0.03	ND
MW023	PFOS+PFHxS	ND	ND	NA	ND	NA	NA	ND	ND
	PFOA	ND	ND	NA	ND	NA	NA	ND	ND

NA = Not assessed

ND = Not detected above laboratory limits of reporting

Table 16 Northern monitoring wells Sum of PFOS and PFHxS statistical analysis results

Well ID	Trend	Confidence Factor
MW032	Stable	50.0%
MW034	No Trend	84.6%
MW023	Not evaluated	Not evaluated

8.2.3 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. These 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 PFOA and Sum of PFOS and PFHxS in the vicinity of Source Areas 2 and 3 are presented in **Table T2** (**Appendix B**) and graphically in **Graph A3** (**Appendix C**). Graphical representation is presented for wells MW004, MW031 and MW080 only.

- Monitoring locations MW004 and MW080 recorded concentrations above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFHxS and PFOS at least once during the monitoring period. Monitoring location MW080 recorded a first time exceedance of the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFHxS and PFOS during the April 2021 monitoring event. Analytical results are summarised in Table 17 below.
- The PFAS concentration at MW004D is reported below laboratory detection limits for the data set, suggesting limited connectivity between aquifer units and that PFAS may be present primarily in the upper aquifer unit.
- MW004 was reported as being blocked in December 2019 and alternate well MW005 was sampled. Results reported during the interim reporting period for MW004 were within the historical range. Results reported for MW005 were below laboratory detection limits. MW004 was able to be sampled in November 2020 and April 2021. Monitoring location MW004 reported a new high concentration of Sum of PFOS and PFHxS of 0.28 µg/L. As sample analysis results from MW005 appear to not be comparable to sample analysis results from MW004, additional monitoring data will need to be collected from MW004 to determine if there is an increasing trend in this location.
- Statistical analysis was not conducted for monitoring locations MW004D and MW018 as the results from these locations are below the LOR for all events. Statistical analysis was not conducted for monitoring location MW004 as the previous year's samples were collected from MW005, which had results that were below the LOR.
- Monitoring location MW080 exhibits an increase in Sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event. Monitoring location MW080 reported a new high concentration of Sum of PFOS and PFHxS of 0.12 µg/L.

A non-parametric MK statistical trend analysis was not performed for any of the Source Area 2 and 3 wells, as there are either too many results below the LOR or insufficient data to conduct a trends analysis. Statistical analysis results are summarised in

Table 18

Table 17 Source Zone 2 and 3 PFAS Summary Results (µg/L)

Well ID	Analyte	Historical range		Interim monitoring		OMP monitoring			
		Min	Max	Nov-18	May-19	Dec-19	Apr-20	Nov-20	Apr-21
MW004	PFOS+ PFHxS	ND	0.19	0.17	0.07	ND*	ND*	0.08	0.28
	PFOA	ND	ND	ND	ND	ND*	ND*	ND	ND
MW004D	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW080	PFOS+ PFHxS	ND	0.02	0.05	ND	0.02	0.01	NA	0.12
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW018	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW031	PFOS+ PFHxS	ND	ND	0.02	ND	ND	0.02	0.01	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND

NA = Not assessed

ND = Not detected above laboratory limits of reporting

* = Results taken from MW005 as an alternate well to MW004

Table 18 Source areas 2 and 3 Sum of PFOS and PFHxS statistical analysis results

Well ID	Trend	Confidence Factor
MW004	Not evaluated	Not evaluated
MW004D	Not evaluated	Not evaluated
MW080	Increase	Not evaluated
MW018	Not evaluated	Not evaluated
MW031	Not evaluated	Not evaluated

8.2.4 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 PFOA and Sum of PFOS and PFHxS in the vicinity of the southern monitoring wells are presented in **Table T2** (**Appendix B**) and graphically in **Graph A4** (**Appendix C**). Graphical representation is presented for wells MW001 and MW030 only.

Monitoring locations MW001 and MW030 recorded concentrations above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L for PFHxS and PFOS in both events

during the monitoring period. MW029 has not reported a PFAS concentration above laboratory detection limits. Analytical results are summarised in **Table 19** below.

Statistical analysis was not conducted for monitoring location MW029 as the results from this location is below the LOR for all events.

Monitoring location MW001 exhibits a decrease in Sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event. Monitoring location MW030 does not exhibit a notable change in Sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event.

A non-parametric MK statistical trend analysis was performed using the Interim and Ongoing Monitoring data for monitoring locations MW001 and MW030. The MK statistical trends analysis indicates that both MW001 and MW030 exhibit potentially stable trends, Statistical analysis results are summarised in

Table 20 below.

Table 19 Southern monitoring wells PFAS summary results (µg/L)

Well ID	Analyte	Historical range		Interim monitoring		OMP monitoring			
		Min	Max	Nov-18	May-19	Dec-19	Apr-20	Nov-20	Apr-21
MW001	PFOS+ PFHxS	0.15	0.35	0.22	0.13	NA	0.35	0.23	0.12
	PFOA	ND	ND	ND	ND	NA	<0.01	ND	ND
MW029	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND
MW030	PFOS+ PFHxS	0.14	0.23	0.23	0.18	0.15	0.12	0.19	0.13
	PFOA	0.11	0.11	ND	0.01	ND	ND	ND	ND

NA = Not assessed
ND = Not detected above laboratory limits of reporting

Table 20 Southern monitoring wells Sum of PFOS and PFHxS statistical analysis results

Well ID	Trend	Confidence Factor
MW001	Stable	59.2%
MW029	Not evaluated	Not evaluated
MW030	Stable	71.9%

8.2.5 Shoal Bay Receiving Station

Two abstraction bores are located within the SBRS, approximately 5.75 kms north of the Base and are used for potable water purposes. Each abstraction bore is monitored, these are:

- MW112
- MW113

Samples from 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 21** below.

Two samples were collected from monitoring locations MW112 and MW113 each during the November 2020 sampling event. One first-flush sample was collected as soon as the pumps were engaged, and a second sample collected after the pipes were purged. Both sample sets did not have reported PFAS concentrations above the LOR.

Historical concentrations of PFOA and Sum of PFOS and PFHxS abstraction bores MW112 and MW113 are presented in **Table T2** (**Appendix B**). No graphical representation or statistical analysis are performed for these locations as all results for these locations are below the LOR.

Table 21 On-Base Shoal Bay Receiving Station PFAS summary results (µg/L)

Well ID	Analyte	Historical range		Interim monitoring		OMP monitoring			
		Min	Max	Nov-18	May-19	Dec-19	Apr-20	Nov-20	Apr-21
MW112	PFOS+ PFHxS	ND	ND	ND	ND	ND	NA	ND	ND
	PFOA	ND	ND	ND	ND	ND	NA	ND	ND
MW113	PFOS+ PFHxS	ND	ND	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND

NA = Not assessed
ND = Not detected above laboratory limits of reporting

8.3 Surface water

8.3.1 Base drainage lines; central, southeast, southwest and eastern boundaries

Five surface water monitoring locations are positioned throughout the Base, 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 downgradient 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 Robertson Barracks
- 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 PFOA and Sum of PFOS and PFHxS in surface water from the above listed locations are presented in **Table T5** (**Appendix B**) and graphically (Sum of PFOS and PFHxS only) in **Graph 2A** (**Appendix C**). Most samples analysed for PFOA from monitoring locations in this area were below the LOR, and therefore no graphical representation has been developed for PFOA results for this monitoring area.

Monitoring locations SW023 and SW028 were dry during both sampling events that occurred during the reporting period. Monitoring location SW007 did not exhibit PFAS concentrations above the LOR. Monitoring locations SW001, SW059 and SW075 exhibited concentrations above laboratory limit of reporting for Sum of PFOS and PFHxS (but within historical maxima) and reported PFOA concentrations below the laboratory limit of reporting during the OMP monitoring events.

None of the monitoring locations in this area had PFHxS and PFOS concentrations at or above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L in samples analysed during the reporting period. Concentrations of PFOS were above the 99% Freshwater Ecological criteria (0.00023 µg/L) at locations SW001 and SW059.

Analytical results are summarised in **Table 22** below.

Monitoring location MW001 exhibits an increase in sum of PFOS and PFHxS concentrations when comparing the January 2020 monitoring event to the December 2020 monitoring event. While this change is noted, it is not considered significant as PFOS and PFHxS concentrations are near the LOR and significantly lower than guideline values, PFOS and PFHxS concentrations do not exhibit a notable change between the April 2020 event and the April 2021 event, and concentrations remain below the historical high of 0.09 µg/L recorded in 2018. Monitoring location MW059 exhibits a decrease in sum of

PFOS and PFHxS concentrations when comparing the January 2020 monitoring event to the December 2020 monitoring event. Aside from the noted concentration change in MW059, there is no other evidence to suggest a decreasing trend is developing at this location.

A non-parametric MK statistical trend analysis was performed using the Interim and Ongoing Monitoring data for monitoring locations SW001, SW059 and SW075. The MK statistical trends analysis indicates that SW001 has a potentially stable trend, SW075 has a potentially decreasing trend, and SW059 has no statistical trend, Statistical analysis was not conducted for monitoring location SW007 as concentrations of Sum of PFOS and PFHxS and PFOA from this location have been at or below the LOR for all events since 2017. Statistical analysis was not conducted for monitoring locations SW023 and SW028 as no samples were collected from these locations during the reporting period.

Monitoring locations SW001 and SW075 do not exhibit a notable change in Sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event.

A non-parametric MK statistical trend analysis was not performed for any of the on-Base drainage lines central, southeast, southwest and eastern boundaries surface water monitoring locations, as there are either too many results below the LOR or insufficient data to conduct a trends analysis. Statistical analysis results are summarised in **Table 23** below.

Table 22 On-Base drainage lines PFAS summary results (µg/L)

Location ID	Analyte	Historical range		Interim monitoring		OMP monitoring				
		Min	Max	Nov-18	Apr-19	Dec-19	Jan-20	Apr-20	Dec-20	Apr-21
SW001	PFOS+PFHxS	0.05	0.09	NA	NA	NA[1]	ND	0.04	0.03	0.03
	PFOA	ND	ND	NA	NA	NA[1]	ND	ND	ND	ND
SW007	PFOS+PFHxS	ND	0.04	NA	ND	ND	ND	ND	ND	ND
	PFOA	ND	ND	NA	ND	0.01	ND	ND	ND	ND
SW023	PFOS+PFHxS	-	0.01	NA	NA	NA[1]	ND	NA[1]	NA[1]	NA[1]
	PFOA	-	0.03	NA	NA	NA[1]	ND	NA[1]	NA[1]	NA[1]
SW028	PFOS+PFHxS	-	0.18	NA	NA	NA[1]	ND	NA[1]	NA[1]	NA[1]
	PFOA	-	ND	NA	NA	NA[1]	ND	NA[1]	NA[1]	NA[1]
SW059	PFOS+PFHxS	ND	0.67	ND	0.12	NA[1]	0.08	NA[1]	0.01	0.05
	PFOA	ND	0.03	ND	ND	NA[1]	ND	NA[1]	ND	ND
SW075	PFOS+PFHxS	ND	0.13	0.11	0.08	0.01	ND	0.02	0.01	0.02
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND	ND

[1] Location dry
NA = Not assessed
ND = Not detected above laboratory limits of reporting

Table 23 On-Base drainage lines Sum of PFOS and PFHxS statistical analysis results

Well ID	Trend	Confidence Factor
SW001	Stable	37.5%
SW007	Not evaluated	Not evaluated
SW023	Not evaluated	Not evaluated

Well ID	Trend	Confidence Factor
SW028	Not evaluated	Not evaluated
SW059	No trend	81.5%
SW075	Decreasing	94.6%

8.3.2 Close Training Area

Three surface water monitoring points 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 PFOA and Sum of PFOS and PFHxS in surface water from the above listed locations are presented in **Table T5** (**Appendix B**) and graphically (Sum of PFOS and PFHxS only) in **Graph 2B** (**Appendix C**). All samples analysed for PFOA from monitoring locations in this area were below the LOR, and therefore no graphical representation has been developed for PFOA results for this monitoring area. Graphical representation is presented for monitoring locations SW091 and SW123 only.

Monitoring locations SW086, SW091 and SW123 exhibited concentrations above laboratory limit of reporting for Sum of PFOS and PFHxS and reported PFOA concentrations below the laboratory limit of reporting during the OMP monitoring events. Monitoring location SW086 recorded a first-time detection of Sum of PFOS and PFHxS above the LOR in a sample collected during the April 2021 monitoring event.

None of the monitoring locations in this area had PFHxS and PFOS concentrations at or above the PFAS NEMP (HEPA, 2020) Human Health Drinking Water guideline value of 0.07 µg/L in samples analysed during the reporting period. Concentrations of PFOS were above the 99% Freshwater Ecological criteria (0.00023 µg/L) at locations SW075, SW086, SW091 and SW123. Analytical results are summarised in **Table 24** below.

Monitoring location MW086 exhibits an increase in sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event. While this change is noted, it is not considered significant as sum of PFOS and PFHxS concentrations are near the LOR and significantly lower than guideline values. Monitoring location SW123 does not exhibit a notable change in Sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event. Monitoring location SW091 exhibits a decrease in Sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the April 2021 monitoring event, however, this location reported very low concentrations near the LOR, where accuracy is low, and a change of this magnitude may not be significant.

A non-parametric MK statistical trend analysis was performed using the Interim and Ongoing Monitoring data for monitoring locations SW091 and SW123. The MK statistical trends analysis indicates that both SW091 and SW123 have potentially decreasing trends, A non-parametric MK statistical trend analysis was not performed for SW086, as there are too few results above the LOR to conduct a trends analysis. Statistical analysis results are summarised in

Table 25 below.

Table 24 Close Training Area sum of PFOS and PFHxS and PFOA summary concentrations (µg/L)

Location ID	Analyte	Historical Range		Interim Monitoring		OMP Monitoring				
		Min	Max	Nov-18	May-19	Dec-19	Jan-20	Apr-20	Dec-20	Apr-21
SW086	PFOS +	ND	ND	ND	ND	ND	ND	ND	ND	0.01

Location ID	Analyte	Historical Range		Interim Monitoring		OMP Monitoring				
		Min	Max	Nov-18	May-19	Dec-19	Jan-20	Apr-20	Dec-20	Apr-21
	PFHxS									
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW091	PFOS + PFHxS	ND	0.08	0.08	0.03	0.07	0.01	0.02	0.04	0.01
	PFOA	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW123	PFOS + PFHxS	0.02	0.21	0.34	NA	0.06	0.01	0.02	0.02	0.02
	PFOA	ND	ND	ND	NA	ND	ND	ND	ND	ND

[1] Location dry
NA = Not assessed
ND = Not detected above laboratory limits of reporting

Table 25 Close Training Area sum of PFOS and PFHxS statistical analysis results

Well ID	Trend	Confidence Factor
SW086	Increase	Not evaluated
SW091	Decreasing	93.2%
SW123	Decreasing	95.2%

8.4 Sediment

8.4.1 Base Drainage Lines; Central, South East, Southwest 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 downgradient 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 PFOA and sum of PFOS and PFHxS in sediment from the above listed locations are presented in **Table T7** (**Appendix B**) and graphically (sum of PFOS and PFHxS only) in **Graph 3A** (**Appendix C**). All samples analysed for PFOA from monitoring locations in this area were at or below the LOR, and therefore no graphical representation has been developed for PFOA results for this monitoring area. Graphical representation is presented for monitoring locations SD001, SD028, SD059 and SD075.

Monitoring locations SD001, SD007, SD023, SD059 and SD075 exhibited concentrations below laboratory limit of reporting for PFOA and sum of PFOS and PFHxS during the reporting period. Monitoring location SD028 exhibited a concentration of sum of PFOS and PFHxS above the LOR in a sample collected during the April 2021 monitoring event. Monitoring locations SD028 SD059 and SD075 identified a decrease in sum of PFOS and PFHxS concentrations when comparing the April 2020 monitoring event to the May 2021 monitoring event. **Table 26** below exhibits the results from the Interim and OMP monitoring.

Table 26 On-Base Drainage Lines PFAS Summary Results (mg/kg)

Location ID	Analyte	Historical Range		Interim Monitoring		OMP Monitoring		
		Min	Max	Nov-18	Apr/May-19	Jan-20	Apr-20	May-21
SD001	PFOS+ PFHxS	0.0032	0.0072	NA	0.0015	NA	NA	ND
	PFOA	ND	ND	NA	ND	NA	NA	ND
SD007	PFOS+ PFHxS	ND	ND	NA	ND	NA	ND	ND
	PFOA	ND	ND	NA	ND	NA	ND	ND
SD023	PFOS+ PFHxS	ND	ND	NA	ND	NA	ND	ND
	PFOA	ND	ND	NA	ND	NA	ND	ND
SD028	PFOS+ PFHxS	0.0003	0.0015	NA	0.0004	NA	0.0009	0.0005
	PFOA	ND	0.0002	NA	ND	NA	ND	ND
SD059	PFOS+ PFHxS	ND	0.0002	NA	ND	NA	0.0002	ND
	PFOA	ND	ND	NA	ND	NA	ND	ND
SD075	PFOS+ PFHxS	0.0003	0.0014	NA	0.0007	NA	0.0007	ND
	PFOA	ND	ND	NA	ND	NA	ND	ND

NA = Not Assessed

ND = Not detected above laboratory limits of reporting

8.4.2 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:

- 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 PFOA and sum of PFOS and PFHxS in sediment from the above listed locations are presented in **Table T7** (**Appendix B**) and graphically (sum of PFOS and PFHxS only) in **Graph 3A** (**Appendix C**). All samples analysed for PFOA from monitoring locations in this area were below the LOR, and therefore no graphical representation has been developed for PFOA results for this monitoring area. Graphical representation is presented for monitoring locations SD086, SD091 and SD123.

Monitoring locations SD086, SD091 and SD123 exhibited concentrations below laboratory limit of reporting for PFOA and sum of PFOS and PFHxS during the reporting period. Monitoring location SD123 exhibits a decrease in sum of PFOS and PFHxS concentrations when comparing the April 2020

monitoring event to the May 2021 monitoring event, however, these locations reported very low concentrations near the LOR. **Table 27** below exhibits the results from the Interim and OMP monitoring.

Table 27 Close Training Area sum of PFOS and PFHxS and PFOA summary concentrations (mg/kg)

Location ID	Analyte	Historical Range		Interim Monitoring		OMP Monitoring		
		Min	Max	Nov-18	Apr/May-19	Jan-20	Apr-20	May-21
SD086	PFOS+ PFHxS	0.0008	0.0008	NA	ND	NA	ND	ND
	PFOA	ND	ND	NA	ND	NA	ND	ND
SD091	PFOS+ PFHxS	0.0012	0.0017	NA	0.0002	NA	NA	ND
	PFOA	ND	ND	NA	ND	NA	NA	ND
SD123	PFOS+ PFHxS	0.0022	0.0082	NA	NA	NA	0.0004	ND
	PFOA	ND	ND	NA	NA	NA	ND	ND

NA = Not Assessed
ND = Not detected above laboratory limits of reporting

9.0 Conceptual Site Model

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

The OMP monitoring over the twelve-month period discussed in this report has provided additional data to further understand the nature and magnitude of PFAS concentrations in groundwater, surface water and sediment. 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 concentration range for groundwater and surface water/sediment monitoring locations, recorded during the OMP monitoring period are shown in Figures **A2.1** to **A6** (**Appendix A**).

PFAS concentrations in groundwater have increased in monitoring locations MW004 and MW080 in the vicinity of Source Areas 2 and 3, and both locations reported concentrations that exceed previously recorded concentrations. Downgradient wells MW018 and MW031 remain below the LOR indicating the PFAS concentration increases observed in MW004 and MW080 do not currently correlate with downgradient PFAS concentrations increases. No correlating conditions were observed to explain the increase in concentrations. Despite observed PFAS concentrations increases detected in the vicinity of Source Areas 2 and 3, the concentrations reported remain relatively low and do not currently conflict with the CSM as described in the DSI.

Monitoring well MW034 in the northeast part of the Base exhibited a temporary increase in sum of PFOS and PFHxS concentrations when comparing results from the December 2019 sampling event and the November 2020 sampling event. Additionally, monitoring well MW034 had a recorded sum of PFOS and PFHxS concentration equal to the highest recorded concentration at that location in November 2020. Nearby monitoring location MW032 also exhibited a temporary increase in sum of PFOS and PFHxS concentrations in November 2020 but remains within the historical concentration range. There is currently no indication that a trend is emerging in this area.

PFAS concentrations at groundwater monitoring locations in all other areas appear to be stable.

PFAS concentrations in surface water locations both on- and off-base appear to remain stable and below the adopted recreational guideline value, and generally close to the LOR.

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

The data presented in this report do not change the understanding of the CSM.

10.0 Discussion

10.1 Risk Profile

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 (Department of 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 HBGVs 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.

The data collected during ongoing monitoring program over a 12-month monitoring period, when combined with the 2018 – 2019 interim monitoring and 2019-2020 OMP monitoring, suggests that the risk profile to human health and ecological receptors within the Base and off-Base Monitoring Area is overall unchanged, based on the following conclusions of the data assessment:

The groundwater plume extents are generally similar to that which was presented in the 2018 DSI (Senversa, 2018a)

PFAS concentrations are generally highest on-Base in wells in the vicinities of Source Area 1 and Source Areas 2 and 3. The observed increased PFAS concentrations from Source Areas 2 and 3 (MW004 and MW080), while notable, are not significant and do not change the overall site 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 PFHxS and PFOS with the exception of MW030 and MW032 in the southern and northern boundary areas, respectively. There is currently no indication that any groundwater monitoring location has an emerging increasing or decreasing trend.

PFAS concentrations in surface water bodies were generally similar to previous (historical) results with the exception of monitoring location SW086, which recorded a first-time detection of PFOS at the LOR. All surface water monitoring locations with the exception of SW007 reported PFOS concentrations above the PFAS NEMP (HEPA, 2020) 99 percent species protection guideline value of 0.00023 µg/L. The 99 percent 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 percent protection level functions as a conservative approach to measuring ecological risk. All surface water monitoring locations reported PFHxS and PFOS concentrations below

the PFAS NHMRC Recreational Water (NHMRC, 2019) guideline value of 2.0 µg/L. PFAS concentrations measured within surface water locations within the monitoring area remain within and generally below historical PFAS concentrations, suggesting no material change in the risk profile for surface water.

PFAS concentrations in sediment were generally similar or lower than previous (historical) results. PFAS concentrations in sediment are identified as a potential contributor to surface water impacts. While PFAS compounds within sediment may contribute to PFAS concentrations within surface water, continued low PFAS concentrations measured in surface water suggest any contributing impacts of sediment are likely negligible.

An examination of the available groundwater, surface water and sediment data suggest that there has not been a significant change in reported concentration of site CoPC, and thus no change in the risk profile for on- and off-Base human health receptors associated with exposure to PFAS in groundwater, surface water and sediment is inferred.

Based on the data, AECOM considers that the conclusions made in the HHRA (Senversa, 2018b) still apply.

10.2 Triggers for OMP Review

Following a review of the data collected during the current monitoring period, there have been no changes to the understanding of risks associated with PFAS in the Robertson Barracks PFAS Monitoring Area, spatial distribution of PFAS and the need for monitoring of additional media. Conditions within the Monitoring Area recorded over the reported monitoring period do not meet trigger criteria conditions outlined in the PMAP (Department of Defence, 2018) for the requirement to review the OMP. However, since the development of the OMP, the following updated guidance has been published and adopted, and should be included in the next revision of the OMP:

- Recreational water use (NHMRC, 2019), PFAS Recreational Water guidelines
- Groundwater and surface water ecological guidelines (HEPA, 2020), PFAS NEMP freshwater 99% species protection

These updated criteria should be amended in the next revision of the OMP (Department of Defence, 2018).

No other items require updating in the OMP. Changes to the surface water monitoring frequency to include event-based monitoring should be updated through the SAQP.

11.0 Conclusions

11.1 Conclusions

Groundwater, surface water and sediment monitoring were completed between November 2020 and April 2021 in accordance with the SAQP (AECOM, 2021). Data from interim monitoring completed in 2019 and summarised in the 2020 Robertson Barracks Interpretive Report (Department of Defence, 2020) were included in this report for analysis purposes.

The nature and extent of PFAS in groundwater, surface water, and sediment both on- and off-Base has not changed from the understanding presented in the investigation phases and the PMAP (Department of Defence, 2018). The PFAS risk profile and CSM remain accurate as described in the PMAP (Department of Defence, 2018) and the DSI (Senversa, 2018a).

No changes to the CSM are noted and no changes to the risk profile are recommended.

12.0 References

AECOM, 2021a. *Robertson Barracks - Sampling Event Factual Report, November and December 2020. 8 March 2021,* s.l.: s.n.

AECOM, 2021b. *Robertson Barracks - Sampling Event Factual Report, April 2021. 27 September 2021,* s.l.: s.n.

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Senversa, 2018b. *Human Health and Ecological Risk Assessment. 30 August 2018,* s.l.: s.n.

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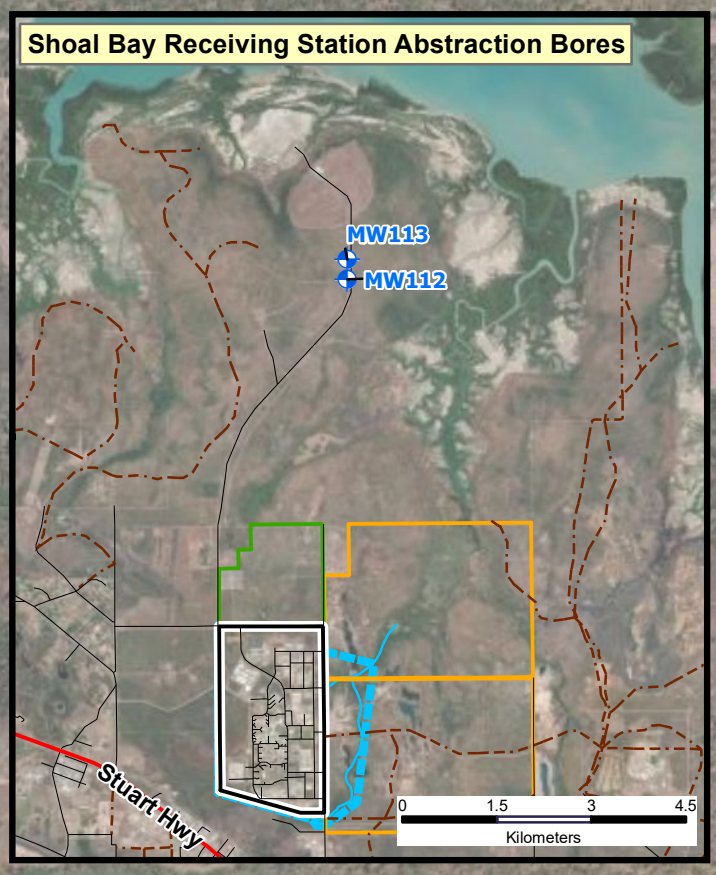
Senversa, 2019b. *Ongoing Monitoring Report October 2018 to May 2019 - Robertson Barracks,* s.l.: s.n.

Appendix A

Figures



Inset shows Offmap Wells from North

Source Area 01

Source Area 02

Source Area 03

Stuart Hwy

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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

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LEGEND

- Groundwater Monitoring Locations
- Monitoring Area
- Source Area
- **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
PFAS OMP Robertson Barracks

Monitoring Area

2021 Interpretive Report

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	KAI.DU - 13 AUG 2021
VERSION:	1

Figure

A1

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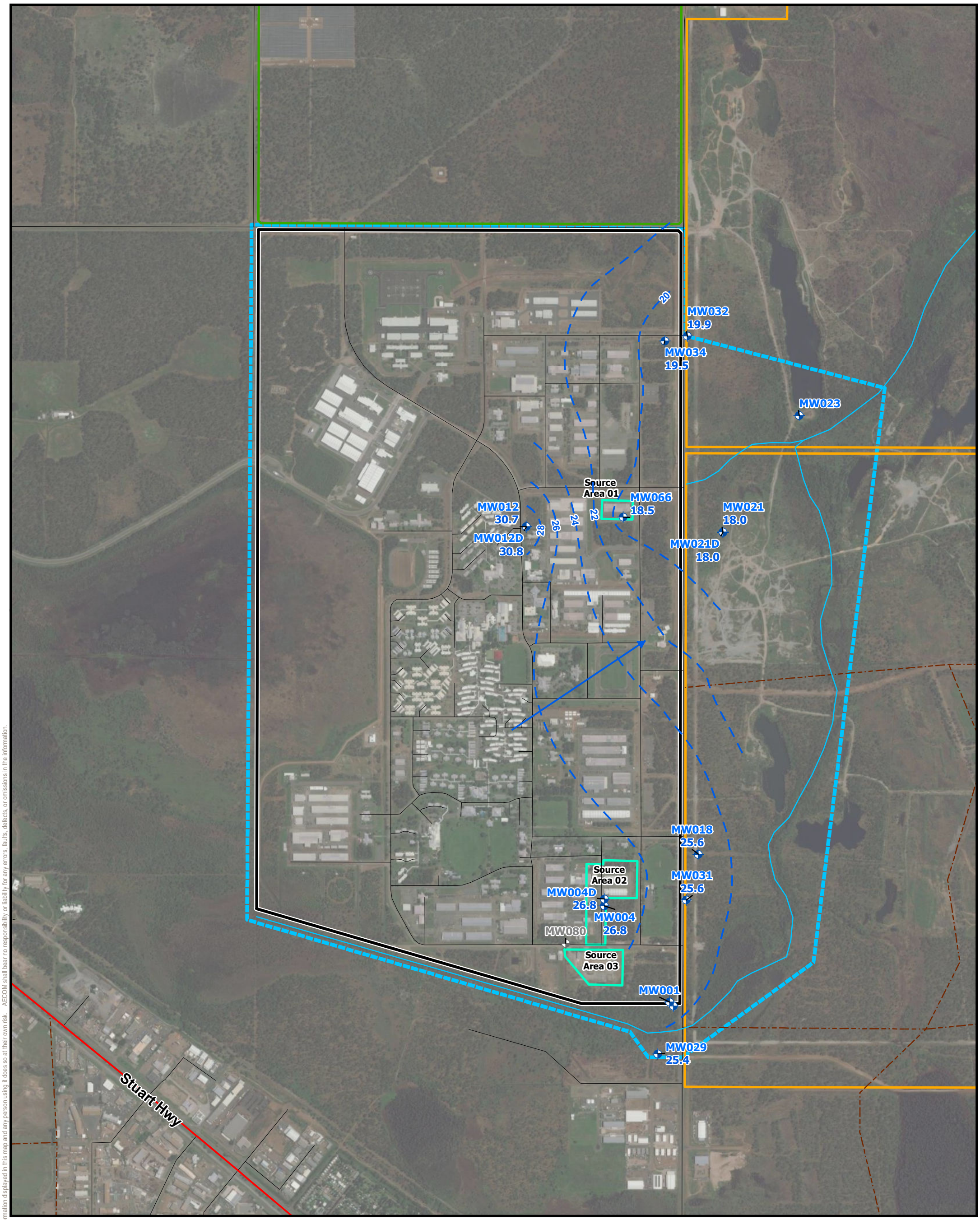

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LEGEND

- Groundwater Monitoring Locations
- Dry/Damaged/Blocked Locations
- Inferred Groundwater Level
- Inferred Flow Direction
- Monitoring Area
- Source Area

Site Layout

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

* Monitoring location was dry during November 2020 sampling event.

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

Department of Defence
PFAS OMP Robertson Barracks

Inferred Groundwater Contours November 2020
2021 Interpretive Report

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CREATED BY	[redacted]
LAST MODIFIED	KAI.DU - 03 SEP 2021
VERSION:	1

Figure
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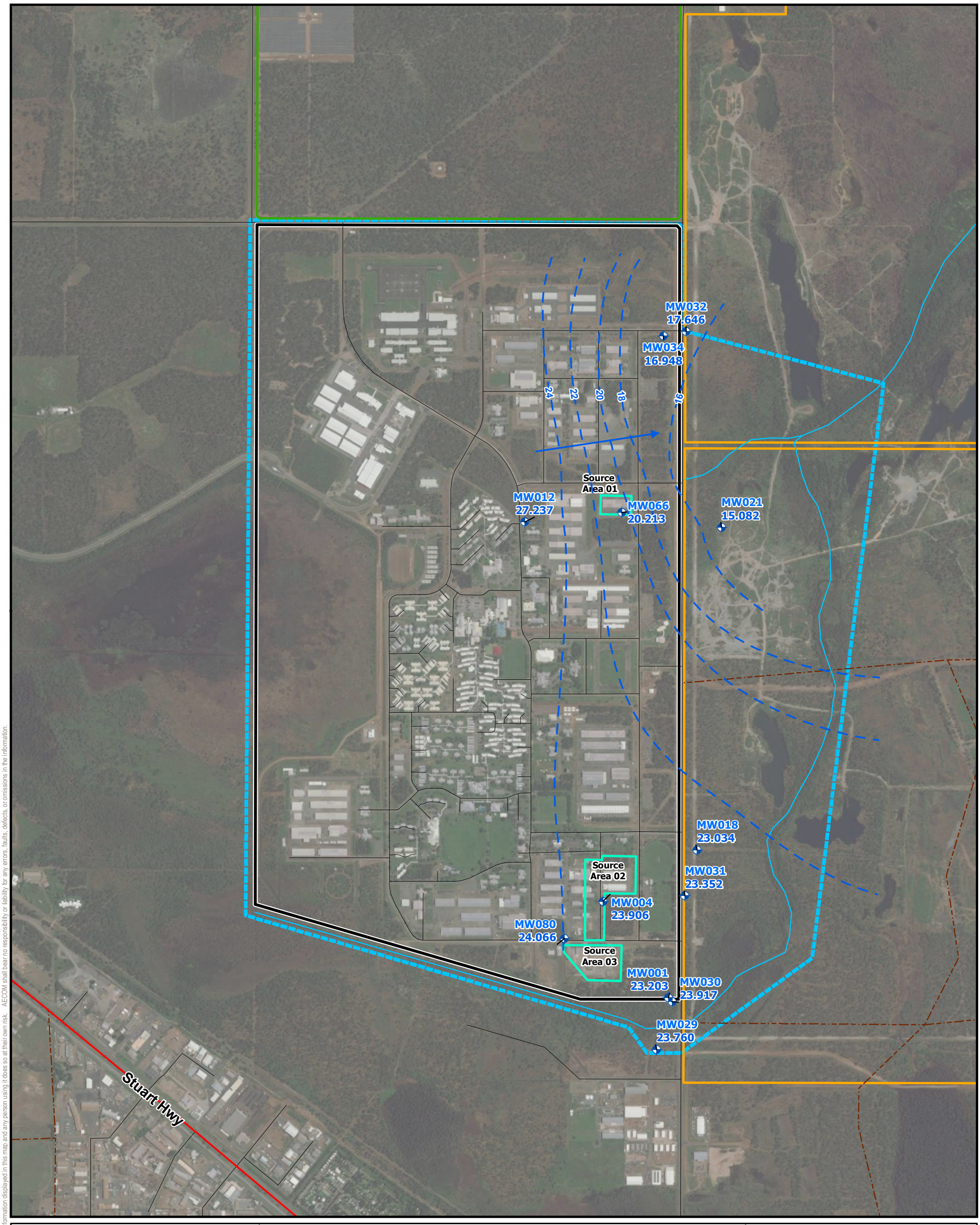

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LEGEND

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

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
PFAS OMP Robertson Barracks

Inferred Groundwater Contours
April 2021
2021 Interpretive Report

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	KAI.DU - 03 SEP 2021
VERSION:	1

Figure
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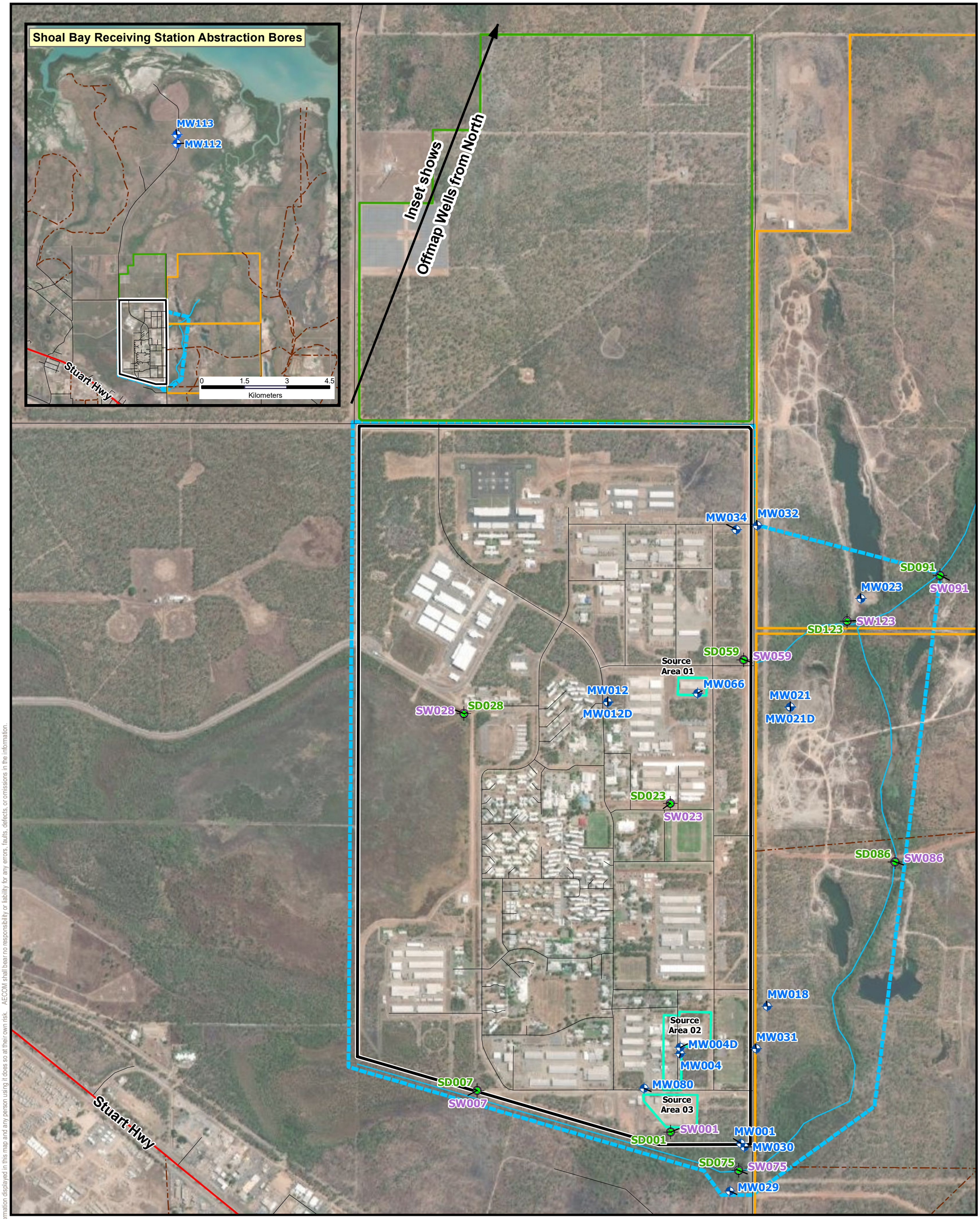

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LEGEND

- Groundwater Monitoring Locations
- Surface Water Monitoring Locations
- Sediment Monitoring 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
PFAS OMP Robertson Barracks
November 2020 and April 2021 Planned Sampling Locations
2021 Interpretive Report

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	KAI.DU - 03 SEP 2021
VERSION:	1

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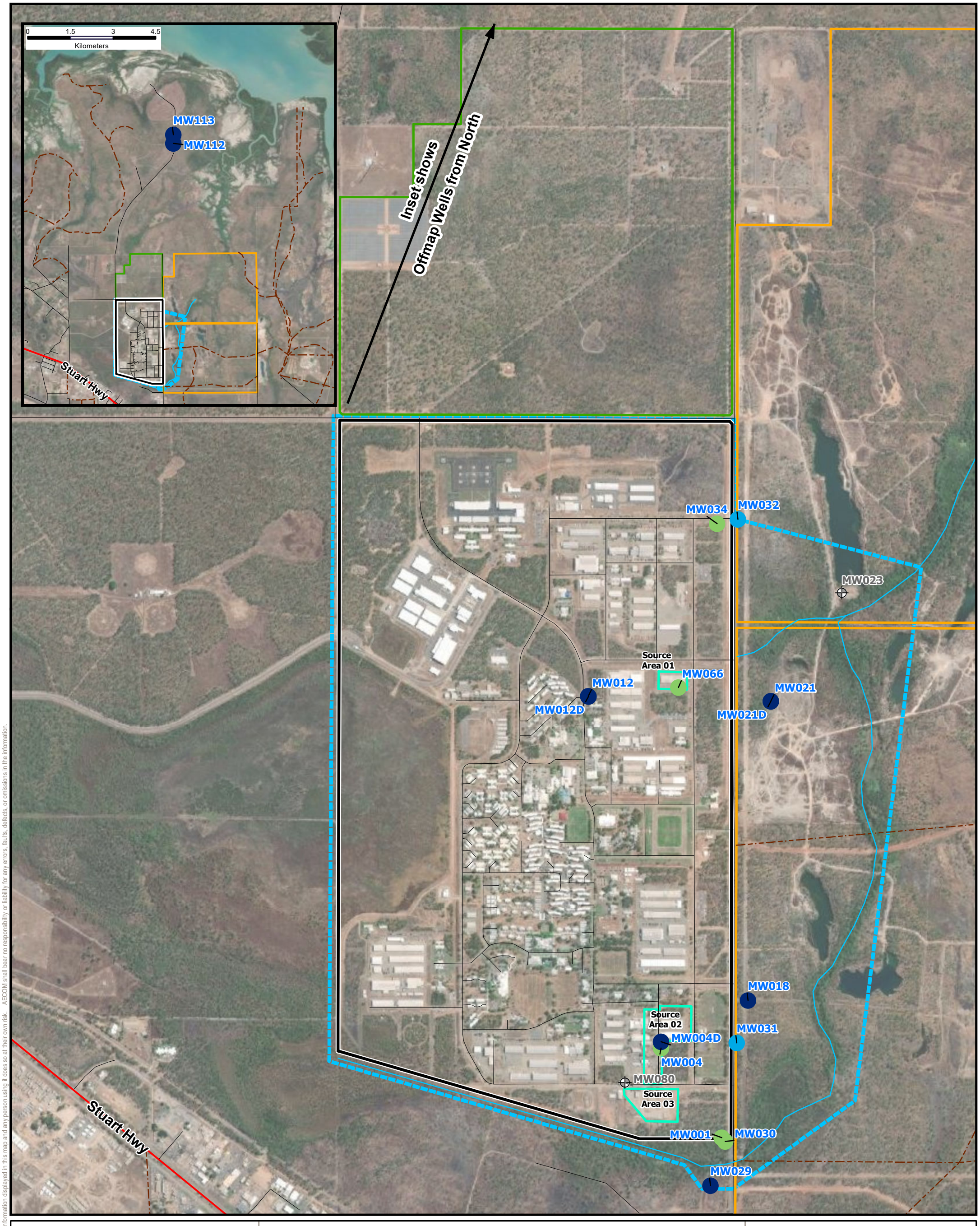

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LEGEND

Dry*

Sum of PFOS and PFHxS Concentrations

- Below LOR
- LOR to 0.07 µg/L
- 0.07 to 0.7 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 2020 sampling event.

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

Department of Defence
PFAS OMP Robertson Barracks

Summary of Groundwater Analytical Results - November 2020

2021 Interpretive Report

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	KAI.DU - 03 SEP 2021
VERSION:	1

Figure

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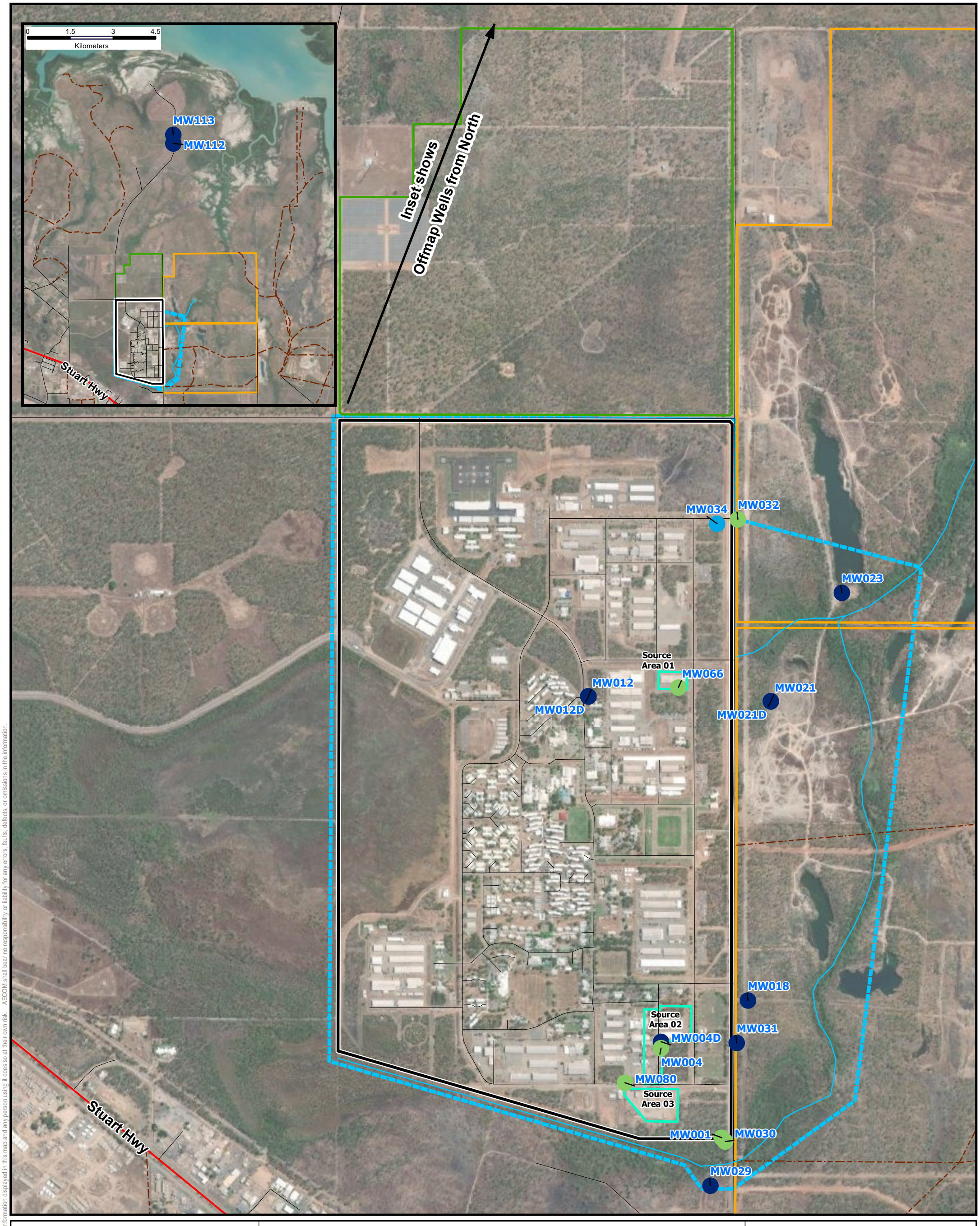

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LEGEND

Sum of PFOS and PFHxS Concentrations
- Below LOR
- LOR to 0.07 µg/L
- 0.07 to 0.7 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
Summary of Groundwater Analytical Results - April 2021
2021 Interpretive Report

PROJECT ID	60612561
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VERSION:	1

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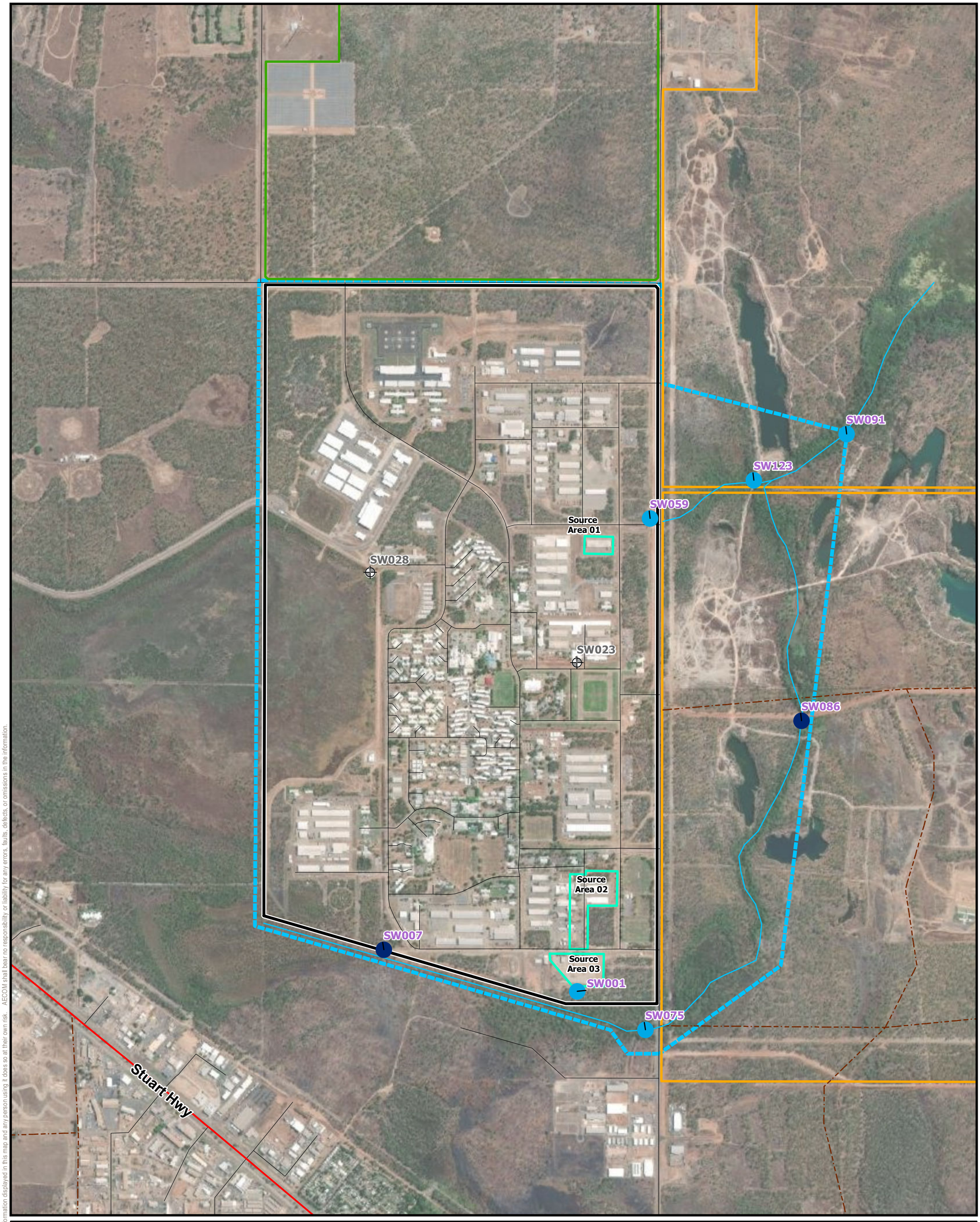

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LEGEND

Dry*

Sum of PFOS and PFHxS Concentrations

Below LOR

LOR to 0.07 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.
* Surface Water location was Dry during December 2020 Sampling Event.

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

Department of Defence
PFAS OMP Robertson Barracks
Summary of Surface Water Analytical Results – December 2020
2021 Interpretive Report

PROJECT ID	60612561
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VERSION:	1

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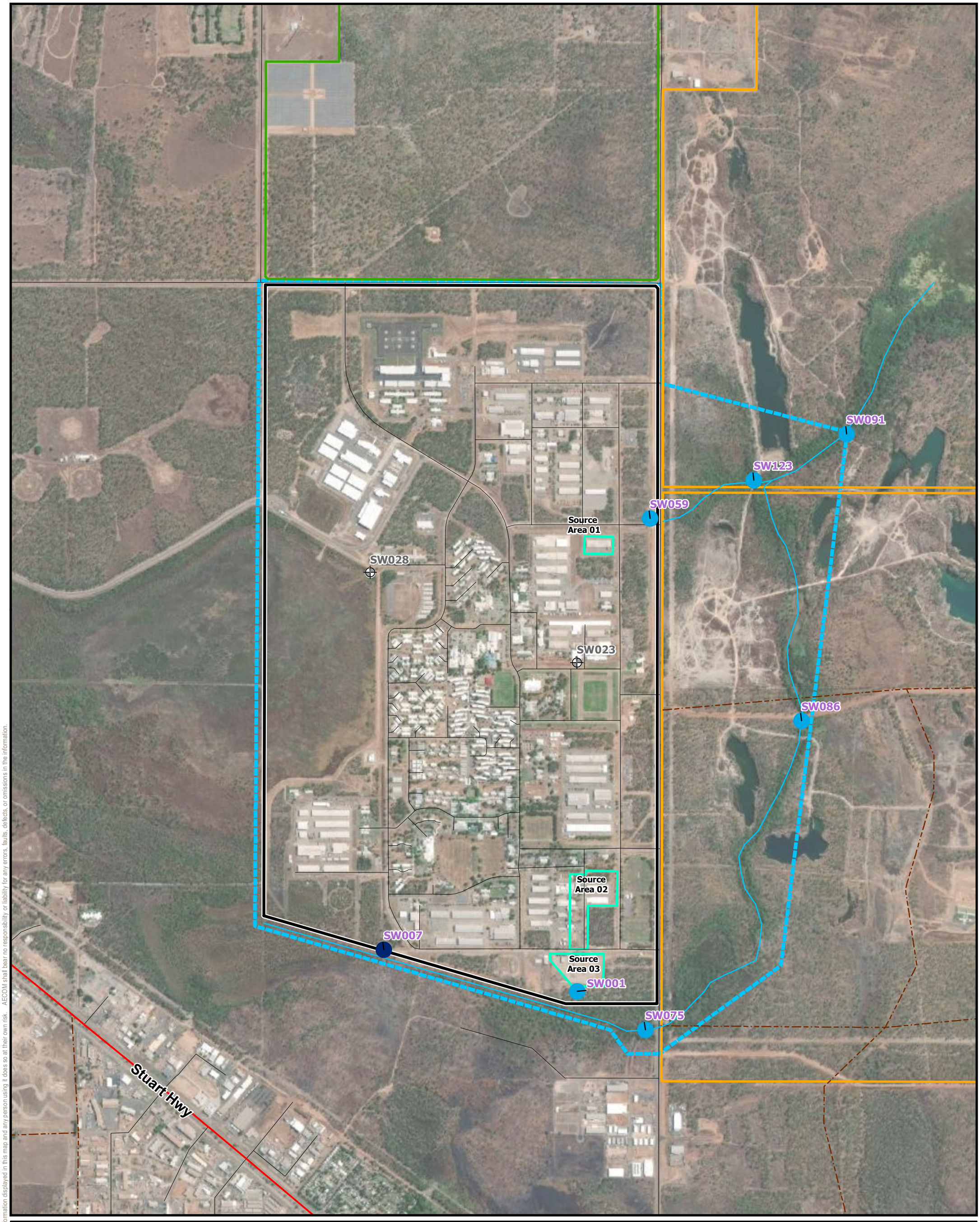

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LEGEND

Dry*

Sum of PFOS and PFHxS Concentrations

Below LOR

LOR to 0.07 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.
* Surface Water location was Dry during April 2021 Sampling Event.

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

Department of Defence
PFAS OMP Robertson Barracks
Summary of Surface Water Analytical Results – April 2021
2021 Interpretive Report

PROJECT ID	60612561
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LEGEND

Sum of PFOS and PFHxS Concentrations

- Below 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

Note: Human health based guidance for residential accessible soil: 0.01 mg/kg.

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

Department of Defence
PFAS OMP Robertson Barracks
Summary of Sediment Analytical Results – April 2021
2021 Interpretive Report

PROJECT ID	60612561
CREATED BY	[redacted]
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VERSION:	1

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Appendix B

Analytical Tables

Table T1
Current and Historical Groundwater Field Results
PFAS OMP
Department of Defence - Robertson Barracks

AECOM

Location ID	Sampled Date	Depth to Water (mbtoc)	Well Depth (mbtoc)	Water Elevation (mAHD)	TOC (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	18/12/2019	-	-	-	-	-	Insufficient water to sample											
	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
	4/11/2020	2.46	8.3	-	-	Good	0.3	46.7	30.4	4.7	197.6	397.6	29.1	Clear	Light Brown	Odourless	No Sheen	Hydrasleeve
	15/04/2021	1.17	-	23.203	24.37	Good	0.9	46.5	30.2	5.6	141.6	341.6	30.6	Cloudy	Grey	Odourless	No Sheen	Hydrasleeve
MW004	18/12/2019	-	-	-	-	-	Insufficent water to sample											
	6/04/2020	3.1	3.5	23.6	26.78	Good	Insufficient water											
	4/11/2020	4.78	8.4	26.8	22.00	Good	0.7	130.9	85.1	5.7	62.8	262.8	30.7	Turbid	Brown	Slight Organic	No Sheen	Hydrasleeve
	15/04/2021	2.87	3.03	23.9	26.78	Good	0.14	814	529.1	6.6	-155.4	44.6	32.3	Cloudy	Grey	Odourless	No Sheen	Hydrasleeve
MW004D	18/12/2019	4.791	32	32		Good	0.82	370.1	241	6.55	177.9		32.4	-	Clear	No odour	No Sheen	Hydrasleeve
	7/04/2020	3.1	32.0	23.7	26.78	Good	1.2	139.6	90.7	6.1	169.4	369.4	30.2	Clear	Brown	-	No Sheen	Hydrasleeve
	4/11/2020	5.70	-	26.8	21.08	Good	1.2	391.5	254.5	6.5	68.3	268.3	31.7	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
	15/04/2021	2.81	31.28	24.0	26.78	Good	0.71	367.5	238.9	6.7	-60.1	139.9	31.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW012	18/12/2019	5.115	10.08	10.08		-	0.36	38.6	25	4.99	189		32.6	Low	Clear	No odour	No Sheen	Hydrasleeve
	7/04/2020	3.9	10.1	26.8	30.65	Good	0.8	29.0	18.9	5.2	219.6	419.6	30.5	Clear	Clear	No odour	No Sheen	Hydrasleeve
	4/11/2020	5.92	8.7	30.7	24.73	Good	0.8	43.5	28.3	5.2	175.2	375.2	32.0	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
	15/04/2021	3.41	10.08	27.2	30.65	Good	0.85	56.8	36.9	5.5	98.5	298.5	32.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW012D	18/12/2019	8.048	30.19	30.19		Good	0.64	52.6	34	5.26	200.3		33.5	Low	Light Brown	No odour	No Sheen	Hydrasleeve
	7/04/2020	5.7	30.2	25.1	30.77	Good	0.8	54.6	35.5	5.5	93.4	293.4	32.3	Clear	Clear	No odour	No Sheen	Hydrasleeve
	4/11/2020	7.94	-	30.8	22.83	Good	2.1	54.9	35.7	6.1	124.0	324.0	31.5	Clear	Colourless	Hydrogen Sulphide	No Sheen	Hydrasleeve
	15/04/2021	5.18	32.00	25.6	30.77	Good	0.62	47.1	30.6	6.2	91.6	291.6	31.4	Clear	Colourless	Hydrogen Sulphide Odour	No Sheen	Hydrasleeve
MW018	18/12/2019	4.14	8.72	8.72		Good	0.79	35.1	23	4.88	266.5		31.7	Low	Clear	No odour	No Sheen	Hydrasleeve
	6/04/2020	2.8	8.7	22.8	25.57	Good	1.8	64.6	42.0	5.2	244.3	444.3	29.9	Clear	Clear	No odour	No Sheen	Hydrasleeve
	4/11/2020	4.00	6.9	25.6	21.57	Good	1.0	39.3	25.5	5.1	182.3	382.3	30.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
	15/04/2021	2.54	8.72	23.0	25.57	Good	1.3	43.2	28.1	5.5	155.5	355.5	30.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021	18/12/2019	2.6	8.71	8.71		Good	0.48	41.7	27	4.71	256.4		32.5	Low	Clear	No odour	No Sheen	Hydrasleeve
	6/04/2020	2.2	8.7	15.8	18.03	Good	1.0	38.8	25.2	5.5	58.1	258.1	31.4	Clear	Clear	Rotten egg smell	No Sheen	Hydrasleeve
	4/11/2020	2.53	7.1	18.0	15.50	Good	2.3	81.1	52.7	7.8	184.4	384.4	30.3	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
	15/04/2021	2.95	8.47	15.1	18.03	Good	0.9	63.6	41.3	5.2	175.2	375.2	30.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021D	18/12/2019	2.71	30.74	30.74		Good	0.54	148.3	96	5.91	217.2		32.3	Low	Light Brown	No odour	No Sheen	Hydrasleeve
	6/04/2020	2.0	30.7	16.0	17.99	Good	0.8	76.1	49.5	5.7	88.0	288.0	30.6	Clear	Grey	No odour	No Sheen	Hydrasleeve
	4/11/2020	2.74	-	18.0	15.25	Good	0.8	157.9	102.6	6.5	180.2	380.2	30.1	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
	15/04/2021	2.22	31.18	15.8	17.99	Good	1.08	144.3	93.8	6.0	135.1	335.1	29.8	Cloudy	Red	Odourless	No Sheen	Hydrasleeve
MW023	6/04/2020	-	5.0	-	-	Good	Dry											
	4/11/2020	Did not sample as location was Dry																
	15/04/2021	5.66	6.75	6.4	12.10	Good	1.26	166.8	108.4	6.1	114.7	314.7	30.4	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW029	18/12/2019	2.92	7.42	7.42		Good	0.88	48.2	31	5.35	173.8		31.9	Medium	Light Brown	No odour	No sheen	Hydrasleeve
	6/04/2020	0.7	7.4	24.7	25.436	Good	9.5	59.6	38.7	5.7	107.2	307.2	31.2	Medium	Grey	-	No sheen	Hydrasleeve
	4/11/2020	2.87	4.5	25.4	22.56	Good	0.0	73.4	47.7	5.8	73.7	273.7	31.9	Clear	Light Brown	Colourless	No sheen	Hydrasleeve
	16/04/2021	1.68	7.80	23.8	25.44	Good	0.5	53	34.5	6.3	73.1	273.1	29.6	Cloudy	Brown	Odourless	No sheen	Hydrasleeve
MW030	18/12/2019	2.16	7.27	7.27		Good	1.16	39	25	4.99	263.6		29.3	Low	Light Brown	No odour	No sheen	Hydrasleeve
	6/04/2020	0.9	7.3	22.5	23.33	Good	10.5	35.6	23.1	5.2	202.2	402.2	29.7	Clear	Clear	No odour	No sheen	Hydrasleeve
	4/11/2020	2.05	5.5	23.3	21.28	Good	0.4	71.0	46.2	5.7	80.1	280.1	28.9	Turbid	Brown	Slight Organic	No sheen	Hydrasleeve
	15/04/2021	0.08	7.17	23.9	24.00	Good	0.6	40.3	26.2	6.7	182.7	382.7	29.8	Cloudy	Colourless	Odourless	No sheen	Hydrasleeve
MW031	18/12/2019	3.895	8.46	8.46		Good	0.65	42.4	28	4.82	247.2		31.6	Medium	Light Brown	No odour	No sheen	Hydrasleeve
	6/04/2020	2.4	8.5	23.2	25.558	Good	7.3	268.0	174.2	6.2	-6.0	194.0	31.4	Clear	Clear	-	No sheen	Hydrasleeve
	4/11/2020	3.77	7.0	25.6	21.79	Good	0.7	73.1	47.5	5.6	108.6	308.6	31.3	Clear	Light Brown	Odourless	No sheen	Hydrasleeve
	16/04/2021	2.21	8.22	23.4	25.56	Good	0.81	42.3	27.5	5.8	122.9	322.9	29.6	Cloudy	Brown	Odourless	No sheen	Hydrasleeve
MW032	18/12/2019	5.677	8.81	8.81		Good	1	87.5	57	5.67	194.9		31.5	-	Clear	No odour	No sheen	Hydrasleeve
	7/04/2020	2.3	8.8	17.6	19.862	Good	1.2	32.4	21.1	5.6	258.8	458.8	32.1	Clear	Clear	No odour	No sheen	Hydrasleeve
	4/11/2020	5.26	7.0	19.9	14.60	Good	1.3	96.5	62.7	5.4	189.5	389.5	31.5	Clear	Colourless	Odourless	No sheen	Hydrasleeve
	16/04/2021	2.22	8.72	17.6	19.86	Good	0.95	29.1	18.9	6.0	129.3	329.3	30.1	Clear	Colourless	Odourless	No sheen	Hydrasleeve
MW034	18/12/2019	5.115	11.471	11.471		Good	1.24	32.3	21	4.82	334.7		31.9	-	Clear	No odour	No sheen	Hydrasleeve
	4/11/2020	6.80	8.8	19.5	12.70	Good	0.3	50.6	32.9	5.2	175.2	375.2	31.7	Clear	Colourless	Odourless	No sheen	Hydrasleeve
	15/04/2021	2.55	11.47	16.9	19.50	Good	0.77	41.5	27.0	5.7	176.9	376.9	32.6	Clear	Colourless	Slight Organic Odour	No sheen	Hydrasleeve
	7/04/2020	2.7	11.5	16.8	19.5	Good	0.9	24.5	15.9	5.0	211.7	411.7	31.2	Clear	Clear	No odour	No sheen	Hydrasleeve
MW066	18/12/2019	4.93				Damaged	0.24	49.6	32	4.43	331.6		33.1	Low	Light Grey	No odour	No sheen	Hydrasleeve
	4/11/2020	4.69	9.82	18.5	23.19	Damaged Gatic Cover	2.0	53.4	34.7	4.5	255.8	455.8	32.3	Clear	Colourless	Odourless	No sheen	Hydrasleeve
	16/04/2021	2.98	11.95	20.2	23.19	Damaged Gatic Cover	1.51	51.4	33.4	5.1	218.3	418.3	30.5	Clear	Colourless	Odourless	No sheen	Hydrasleeve
	7/04/2020	2.0	-	-	-	Broken	-	-	-	-	-	-	-	-	-	-	-	-
MW080	18/12/2019	4.398	13	13		-	0.48	62.5	41	4.95	248.5		32.1	-	Clear	No odour	No sheen	Hydrasleeve
	7/04/2020	2.7	13.0	23.9	26.56	Good	0.9	63.7	41.4	5.3	187.3	387.3	31.0	Clear	Clear	No odour	No sheen	Hydrasleeve
	4/11/2020	Did not sample as location was Dry																
	15/04/2021	2.49	12.99	24.1	26.56	Good	0.67	355.2	230.9	6.3	-5.3	194.7	31.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW112	18/12/2019	-	-	-		-	2.06	404.6	263	6.87	-45.6		33.2	Low	Clear	No odour	No Sheen	Tap
	7/04/2020	-	-	-	-		Did not sample due to electrical pump failure											
	4/11/2020	Did not measure due to tapped well					4.5	385.6	250.6	6.2	23.2	223.2	28.4	Clear	Colourless	Odourless	No Sheen	Grab Sample
	16/04/2021	Did not measure due to tapped well					2.13	375.7	244.2	6.9	-50.1	149.9	31.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
MW113	18/12/2019	-	-	-		-	1.58	332.4	216	6.53	-63.7		32.4	Low	Clear	No odour	No sheen	Tap
	7/04/2020	-	-	-	-		36.4	305.6	198.6	6.6	-2.0	198.0	33.0	Clear	Clear	No odour	No sheen	Tap
	4/11/2020	Did not measure due to tapped well					3.1	342.3	222.5	6.5	-22.6	177.4	30.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
	16/04/2021	Did not measure due to tapped well					1.32	324.1	210.7	6.8	-78.9	121.1	31.7	Clear	Colourless	Hydrogen Sulphide Odour	No Sheen	Grab Sample

Notes:
mbtoc: metres below top of casing
mAHD: metres 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 T2
Historical PFAS Groundwater Results
PFAS OMP
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				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	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFOS and PFHxS	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	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01
Human Health Receptors	**PFAS NEMP (2020) Human Health Drinking Water**																													0.07	0.07	0.56	0.07
Location	**Field ID**	**Sample Date**	**Lab Report**																																
On-Base Wells																																			
MW001	**MW001**	**30/10/2017**	**ES1727209**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.20	0.20	0.13	ND	0.07
	MW001	**8/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15	0.15	0.11	ND	0.04
	MW001	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.22	0.22	0.15	ND	0.07
	MW001	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13	0.13	0.09	ND	0.04
	1200_MW001_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.37	0.35	0.28	ND	0.07
	1200_MW001_201105	**5/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23	0.23	0.17	ND	0.06
	1200_MW001_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	0.12	0.08	ND	0.04
MW004	**MW004**	**30/10/2017**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.17	0.13	0.07	ND	0.06
	MW004	**8/02/2018**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	0.24	0.19	0.11	ND	0.08
	MW004	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0.2	0.17	0.11	ND	0.06
	MW004	**1/05/2019**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.07	0.04	ND	0.03
	1200_MW004_201105	**5/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08	ND	ND
	1200_MW004_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	0.07	ND	ND	ND	0.4	0.28	0.24	ND	0.04
MW004_D	**MW004D**	**2/11/2017**	**ES1727768**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW004D	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW004D	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW004D	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004D_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004D_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004_D_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004D_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW012	**MW012**	**1/11/2017**	**ES1727468**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012	**9/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_181219	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW012_D	**MW012D**	**2/11/2017**	**ES1727768**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012D	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012D	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012D	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012D_181219	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012D_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_D_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012D_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW034	**ROBMW01**	**18/07/2017**	**ES1717949**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.09	0.05	0.05	ND	ND
	ROBMW01	**2/11/2017**	**ES1727768**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05	0.03	ND	0.02
	ROBMW01	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.03	0.03	ND	ND
	ROBMW01	**23/05/2018**	**ES1814996**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.05	ND	ND	ND	0.05	ND	ND	ND	0.22	0.10	0.07	ND	0.03
	ROBMW01	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	ROBMW01	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	0.04	ND	ND	ND	0.15	0.07	0.05	ND	0.02
	1200_ROBMW01_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.06	ND	ND	ND	0.05	ND	ND	ND	0.23	0.09	0.06	0.01	0.03
	1200_MW034_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	0.04	ND	ND	ND	0.15	0.07	0.05	ND	0.02
	1200_MW034_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.2	ND	ND	ND	0.12	ND	ND	ND	0.65	0.21	0.15	0.03	0.06
	1200_MW034_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	0.04	ND	ND	ND	0.14	0.07	0.04	ND	0.03

Table T2
Historical PFAS Groundwater Results
PFAS OMP
Department of Defence - Robertson Barracks

				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	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFOS and PFHxS	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01
Human Health Receptors	**PFAS NEMP (2020) Human Health Drinking Water**																													0.07	0.07	0.56	0.07
Location	**Field ID**	**Sample Date**	**Lab Report**																															
MW066	**103MW02**	**18/07/2017**	**ES1717949**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	0.04	ND	ND	0.02	ND	ND	ND	ND	0.72	0.62	0.48	0.02	0.14
	103MW02_H	**20/07/2017**	**ES1717949**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	0.02	ND	ND	ND	ND	0.72	0.64	0.51	0.02	0.13
	103MW02	**1/11/2017**	**ES1727468**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	0.85	0.78	0.61	0.02	0.17
	103MW02	**12/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	ND	ND	ND	ND	0.03	0.04	0.16	ND	ND	0.09	0.04	ND	ND	ND	1.96	1.44	1.04	0.08	0.4
	103MW02	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.61	0.55	0.41	0.02	0.14
	103MW02	**3/05/2019**	**ES1913032**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.47	0.43	0.34	0.02	0.09
	1200_103MW02_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.36	0.33	0.25	0.01	0.08
	1200_MW066_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.53	0.47	0.36	0.02	0.11
	1200_MW066_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0.48	0.43	0.34	0.02	0.09
	1200_MW066_210416	**16/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.57	0.51	0.39	0.02	0.12
MW080	**256MW01**	**1/06/2016**	**ES1611898**	-	-	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND	ND	-
	ROBMW07	**1/06/2016**	**ES1611898**	-	-	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND	ND	-
	ROBMW07	**18/07/2017**	**ES1717949**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ROBMW07	**30/10/2017**	**ES1727209**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ROBMW007	**8/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.04	0.02	0.02	ND	ND
	ROBMW07	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	0.03	ND	ND	0.10	0.05	0.03	ND	0.02
	ROBMW07	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_ROBMW07_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	1200_MW080_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_MW080_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.07	ND	ND	ND	0.13	ND	ND	ND	0.34	0.12	0.08	ND	0.04
Off-Base Wells																																		
MW018	**MW018**	**1/11/2017**	**ES1727468**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW018	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW018	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW018	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_191219	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_200407	**6/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW021	**MW021**	**2/11/2017**	**ES1727768**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021	**9/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW0021_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_200406	**6/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW021_D	**MW021D**	**1/11/2017**	**ES1727468**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021D	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	MW21D	**23/05/2018**	**ES1814996**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021D	**28/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021D	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021D_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021D_200406	**6/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_D_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021D_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW023	**MW023_0.0**	**19/10/2017**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW023	**2/11/2017**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW023_0.0	**31/01/2018**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW023	**10/02/2018**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW023	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW023_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table T2
Historical PFAS Groundwater Results
PFAS OMP
Department of Defence - Robertson Barracks

				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	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFOS and PFHxS	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	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01
Human Health Receptors	**PFAS NEMP (2020) Human Health Drinking Water**																													0.07	0.07	0.56	0.07
Location	**Field ID**	**Sample Date**	**Lab Report**																																	
MW029	**MW029**	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW029	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW029	**2/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_200406	**6/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_210416	**16/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW030	**MW030**	**12/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0.16	0.14	0.11	ND	0.03
	MW030	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0.25	0.23	0.16	ND	0.07
	MW030	**2/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0.22	0.18	0.12	0.01	0.06
	1200_MW030_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15	0.15	0.1	ND	0.05
	1200_MW030_200406	**6/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0.14	0.12	0.08	ND	0.04
	1200_MW030_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19	0.19	0.14	ND	0.05
	1200_MW030_210415	**15/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0.15	0.13	0.09	ND	0.04
MW031	**MW031**	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW031	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	MW031	**2/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW031_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW031_200406	**6/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	1200_MW031_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_MW031_210416	**16/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW032	**MW032**	**10/02/2018**	**ES1804616**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW032	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	0.06	ND	ND	ND	0.21	0.09	0.05	ND	0.04
	MW032	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.07	0.05	ND	0.02
	1200_MW032_191218	**18/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_MW032_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	0.03	ND	ND	ND	0.14	0.08	0.05	ND	0.03
	1200_MW032_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.04	0.04	ND	ND
	1200_MW032_210416	**16/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	0.06	ND	ND	ND	0.19	0.08	0.05	ND	0.03
MW112	**SBRS1**	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS-1	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS1 (OSP002_Bore01)	**17/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW112_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW112-FF_201104		**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW112_210416	**16/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW113	**SBRS2**	**27/11/2018**	**ES1835504**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS-2	**1/05/2019**	**ES1913246**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS2 (OSP002_Bore02)	**17/12/2019**	**ES1942300**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW113_200407	**7/04/2020**	**ES2012108**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW113_201104	**4/11/2020**	**ES2039161**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW113-FF_201104		**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW113_210416	**16/04/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes
LOR: Limit of reporting
µg/L: micrograms per Litre
ND: No Detect above LOR
-: not known/not available
(FF) = First Flush Sample (First-flush sample was collected as soon as the pumps were engaged, and a second sample collected after the pipes were purged).

Table T3
Historical Non-PFAS Surface Water Analytical Results
PFAS OMP
Department of Defence - Robertson Barracks

					DOC		Inorganics										Metals		
					Dissolved Organic Carbon	TSS	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Fluoride	Sodium (Filtered)	Sulfate as SO4 - Turbidimetric (Filtered)	Calcium (Filtered)	Magnesium (Filtered)	Potassium (Filtered)
					mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				PQL	1	1	0.01	10	5	1	0.1	1	1	1000	1	1	1	0.01	0.01
Location_Code	**Field_ID**	**Sampled_Date_Time**	**Lab_Report_Number**	**Sample Type**															
MW004	1200_MW004_201105	5/11/2020	ES2039161	Primary	4	1240	20	<1	<1000	20	0.06	0.35	7	<0.1	8	<1	<1	<1	<1
MW004D	1200_MW004D_191218	18/12/2019	ES1942300		8	329	186	<1	<1000	186	3.88	2.94	3	0.5	40	4	6	10.0	3.0
	1200_MW004D_200407	7/04/2020	ES2012108	Primary	4	47	160	<1	<1000	160	3.3	3.5	3	0.5	41	4	10	14	3
	1200_MW004_D_201104	4/11/2020	ES2039161	Primary	3	54	167	<1	<1000	167	3.53	3.24	4	0.5	39	4	9	12.0	4.0
MW005	1200_MW005_200407	7/04/2020	ES2012108	Primary	<1	24	8	<1	<1000	8	0.2	0.1	3	<0.1	3	<1	<1	<1	<1
MW012	1200_MW012_181219	18/12/2019	ES1942300	Primary	6	108	10	<1	<1000	10	0.28	0.09	3	<0.1	2	<1	<1	<1	<1
	1200_MW012_201104	4/11/2020	ES2039161	Primary	<1	42	4	<1	<1000	4	0.14	0.09	2	<0.1	2	<1	<1	<1	<1
MW012D	1200_MW012D_181219	18/12/2019	ES1942300	Primary	6	1500	23	<1	<1000	23	0.5	0.3	<1	<0.1	7	2	<1	<1	<1
	1200_MW012D_200407	7/04/2020	ES2012108	Primary	5	118	10	<1	<1000	10	0.3	0.3	2	<0.1	6	<1	<1	<1	<1
	1200_MW012_D_201104	4/11/2020	ES2039161	Primary	3	8	16	<1	<1000	16	0.38	0.29	2	<0.1	6	<1	<1	<1	1
MW021	1200_MW0021_191218	18/12/2019	ES1942300	Primary	12	89	3	<1	<1000	3	0.2	0.17	5	<0.1	2	<1	<1	1	<1
	1200_MW021_200406	6/04/2020	ES2012108	Primary	<1	21	4	<1	<1000	4	0.2	0.2	5	<0.1	2	<1	<1	1	<1
	1200_MW021_201104	4/11/2020	ES2039161	Primary	1	208	8	<1	<1000	8	0.3	0.13	5	<0.1	3	<1	<1	<1	<1
MW021D	1200_MW0021D_191218	18/12/2019	ES1942300	Primary	1	684	63	<1	<1000	63	1.38	1.24	3	0.2	8	2	7	6	2
	1200_MW021D_200406	6/04/2020	ES2012108	Primary	1	784	58	<1	<1000	58	1.3	1.3	3	0.1	8	2	8	6	2
	1200_MW021_D_201104	4/11/2020	ES2039161	Primary	<1	64	66	<1	<1000	66	1.42	1.31	2	0.1	9	2	7	6	3
MW112	SBRS1 (OSP002_Bore01	17/12/2019	ES1942300	Primary	<1	11	169	<1	<1000	169	3.53	3.2	4	0.4	9	2	40	9	3
	1200_MW112_201104	4/11/2020	ES2039161	Primary	<1	<5	176	<1	<1000	176	3.67	3.47	4	0.2	11	2	43	9	4
MW113	SBRS2 (OSP002_Bore02	17/12/2019	ES1942300	Primary	<1	<5	143	<1	<1000	143	2.96	2.42	3	0.3	10	1	25	8	3
	1200_MW113_200407	7/04/2020	ES2012108	Primary	<1	9	124	<1	<1000	124	2.7	2.6	4	0.2	9	3	30	8	3
	1200_QC101_200407	7/04/2020	ES2012108	Intralab Duplicate	<1	10	138	<1	<1000	138	3	2.6	4	0.2	9	3	30	8	2
	1200_MW113_201104	4/11/2020	ES2039161	Primary	<1	<5	146	<1	<1000	146	3.07	2.8	4	0.3	10	2	31	9	3

Notes:
PQL: Practical Quantitation Limits
mg/L: milligram per Litre
µg/L: micrograms per Litre

Table T4
Surface Water Field Results
PFAS OMP
Department of Defence - Robertson Barracks

		Field Measurement										
Location ID	**Sampled Date**	**DO (mg/L)**	**EC (µS/cm)**	**TDS (calc) (mg/L)**	**pH**	**Eh (mV)**	**Temp (°C)**	**Turbidity**	**Water Colour**	**Odour**	**Sheen**	**Sample Method**
SW001	22/01/2020	5.1	16.0	10.40	6.82	224	25.5	Clear	Clear	No odour	No sheen	Grab sample
	6/04/2020	73.4	48.8	31.70	6.38	165.1	35.1	Clear	No Colour	No Odour	No Sheen	Grab
	21/12/2020	3.5	83.6	54.34	7.41	181.3	30.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	4.6	55.8	36.27	6.23	107.1	34.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW007	18/12/2019	2.7	65.5	42.58	6.37	241.7	35.6	-	-	No odour	-	Grab sample
	22/01/2020	5.0	13.1	8.52	7.13	197.9	24.4	Clear	Clear	No odour	No sheen	Grab sample
	6/04/2020	5.4	39.4	25.60	5.94	204.2	34.3	Clear	No Colour	No Odour	No Sheen	Grab
	21/12/2020	6.0	42.2	27.43	7.92	141.3	31.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	6.8	21.7	14.11	5.42	208.8	32.8	Clear	Colourless	Hydrogen Sulphide Odour	No Sheen	Grab Sample
SW023	18/12/2019	Sampling location dry - unable to sample										
	22/01/2020	5.7	22.1	14.37	7.12	185.2	25.2	Clear	-	No odour	No sheen	Grab sample
	6/04/2020	Sampling location dry - unable to sample										
	21/12/2020	Sampling location dry - unable to sample										
	15/04/2021	Sampling location dry - unable to sample										
SW028	18/12/2019	Sampling location dry - unable to sample										
	22/01/2020	4.2	8.8	5.72	7.16	189.2	24.8	Clear	Clear	No odour	No sheen	Grab sample
	6/04/2020	Sampling location dry - unable to sample										
	21/12/2020	Sampling location dry - unable to sample										
	15/04/2021	Sampling location dry - unable to sample										
SW059	18/12/2019	Sampling location dry - unable to sample										
	22/01/2020	5.0	42.1	27.37	6.81	198.9	25.2	Clear	Clear	No odour	No sheen	Grab sample
	21/12/2020	4.2	25.5	16.58	7.74	165.3	33.2	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	4.3	27.5	17.88	6.72	97.4	35.0	Clear	Colourless	Slight Organic Odour	No Sheen	Grab Sample
SW075	18/12/2019	4.3	35.7	23.21	6.03	261.0	31.3	Low	Clear	No odour	No sheen	Grab sample
	22/01/2020	5.2	21.8	14.17	6.84	206.9	25.0	Clear	Clear	No odour	No sheen	Grab sample
	6/04/2020	55.5	32.8	21.30	6.11	205.1	31.3	Clear	No Colour	No Odour	No Sheen	Grab
	15/12/2020	0.9	40.4	26.26	6.32	161.9	29.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	-	28.3	18.40	5.45	158.6	31.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW086	18/12/2019	3.8	40.9	26.59	5.75	167.0	34.9	Low	Clear	No odour	No sheen	Grab sample
	22/01/2020	5.0	24.4	15.86	7.17	212.6	25.2	Clear	Clear	No odour	No sheen	Grab sample
	6/04/2020	3.5	28.6	18.50	6.35	148.4	31.1	Clear	No Colour	No Odour	No Sheen	Grab
	15/12/2020	0.9	36.1	23.47	5.76	155.0	29.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	4.7	23.5	15.28	5.31	133.2	28.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW091	18/12/2019	3.9	47.4	30.81	6.01	105.9	30.6	-	Clear	No odour	-	Grab sample
	22/01/2020	4.9	24.9	16.19	7.40	153.0	25.6	Clear	Clear	No odour	No sheen	Grab sample
	6/04/2020	3.9	176.1	114.40	7.09	97.5	30.3	Clear	No Colour	No Odour	No Sheen	Grab
	15/12/2020	1.6	119.9	77.94	8.40	84.0	30.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	4.8	25.7	16.71	7.90	70.1	28.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW123	18/12/2019	1.2	37.5	24.38	5.43	151.8	30.2	Low	Light Brown	No odour	-	Grab sample
	6/04/2020	2.5	26.8	16.00	6.20	165.3	31.3	Clear	No Colour	No Odour	No Sheen	Grab
	15/12/2020	0.6	37.1	24.12	7.94	139.6	34.7	Clear	Colourless	Odourless	No Sheen	Grab Sample
	15/04/2021	3.6	19.1	12.42	6.23	114.9	29.3	Clear	Colourless	Odourless	No Sheen	Grab Sample

Notes:
µS/cm: microsiemens per centimetre
mV: millivolts
°C: degrees Celcius

Table T5
Historical PFAS Surface Water Results
PFAS OMP
Department of Defence - Robertson Barracks

				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	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFOS and PFHxS	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01
Ecological Receptors	PFAS NEMP (2020) FW 99% Species Protection																														0.00023	19	
	NHMRC (2019) PFAS Recreational Water																													2	2	10	2
Location	**Field ID**	**Sample Date**	**Lab Report**																														
On-Base Locations																																	
SW001	SW01	19/07/2017	ES1717949	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.09	0.06	ND	0.03
	SW001	4/10/2017	ES1725240	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05	0.05	ND	ND
	SW001	2/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.09	0.05	ND	0.04
	1200_SW001_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW001_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	0.06	0.04	0.04	ND	ND
	1200_SW001_201221	21/12/2020	ES2045525	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.03	0.03	ND	ND
	1200_SW001_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02		
SW007	SW07	19/07/2017	ES1717949	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.04	0.04	ND	ND
	SW007	2/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW007	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	0.01	ND
	1200_SW007_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_201221	21/12/2020	ES2045525	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW023	SW023	3/02/2018	ES1803868	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.01	0.01	0.03	ND
	1200_SW023_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW028	SW028	2/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18	0.18	0.08	ND	0.1
	1200_SW028_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW059	SW059	1/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	0.02	0.11	ND	ND	0.06	0.03	ND	ND	ND	0.97	0.67	0.38	0.03	0.29
	SW059	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW059	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	0.12	0.12	ND	ND
	1200_SW059_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08	0.06	ND	0.02
	1200_SW059_201221	21/12/2020	ES2045525	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_SW059_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05	0.03	ND	0.02

Table T5
Historical PFAS Surface Water Results
PFAS OMP
Department of Defence - Robertson Barracks

				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	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFOS and PFHxS	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01
Ecological Receptors	PFAS NEMP (2020) FW 99% Species Protection																														0.00023	19	
	NHMRC (2019) PFAS Recreational Water																													2	2	10	2
Location	**Field ID**	**Sample Date**	**Lab Report**																														
Off-Base Locations																																	
SW075	SW075	17/10/2017	ES1725949	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.06	0.06	ND	ND
	SW075	2/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW075	23/05/2018	ES1814996	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13	0.13	0.09	ND	0.04
	SW075	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.11	0.11	0.07	ND	0.04
	SW075	30/04/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08	0.05	ND	0.03
	1200_SW075_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_SW075_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW075_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	1200_SW075_201215	15/12/2020	ES2045382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_SW075_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
SW086	SW086	1/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW086	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW086	30/04/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_201215	15/12/2020	ES2045382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
SW091	SW091	19/10/2017	ES1726436	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08	0.05	ND	0.03
	SW091	1/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW091	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08	0.05	ND	0.03
	SW091	30/04/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.03	0.03	ND	ND
	1200_SW091_191219	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.07	0.04	ND	0.03
	1200_SW091_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
	1200_SW091_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	1200_SW091_201215	15/12/2020	ES2045382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.04	0.04	ND	ND
	1200_SW091_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	ND	ND
SW123	SW123	1/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.23	0.21	0.14	ND	0.07
	SW123	23/05/2018	ES1814996	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW123	27/11/2018	ES1835504	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	0.34	0.23	ND	0.11
	1200_SW123_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.06	0.03	ND	0.03
	1200_SW123_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	1200_SW123_201215	15/12/2020	ES2045382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND
	1200_SW123_210415	15/04/2021	ES2114376	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02	0.02	ND	ND

Notes
LOR: Limit of reporting
µg/L: micrograms per Litre
ND: No Detect above LOR

Table T6
Historical Non-PFAS Surface Water Analytical Results
PFAS OMP
Department of Defence - Robertson Barracks

AECOM

					DOC				Inorganics											Metals		
					Dissolved Organic Carbon	pH (Lab)	TDS	TSS	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Fluoride	Sodium (Filtered)	Sulfate as SO4 - Turbidimetric (Filtered)	Calcium (Filtered)	Magnesium (Filtered)	Potassium (Filtered)
					mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				PQL	1	1	1	1	0.01	10	5	1	0.1	1	1	1000	1	1	1	0.01	0.01
Location_Code	**Field_ID**	**Sampled_Date_Time**	**Lab_Report_Number**	**Sample Type**																	
SW001	1200_SW001_200406	6/04/2020	ES2012098	Normal	2	5.8	32	<5	7	<1	<1000	7	0.34	0.32	7	<0.1	5	<1	2	<1	<1
SW007	1200_SW007_200406	6/04/2020	ES2012098	Normal	3	5.5	22	10	<1	<1	<1000	<1	0.2	0.17	7	<0.1	4	<1	<1	<1	<1
	1200_SW007_201221	21/12/2020	ES2045525	Primary	1	6.18	20	15	10	<1	<1	10	0.31	0.23	4	<0.1	3	<1	2	<1	<1
SW059	1200_SW059_201221	21/12/2020	ES2045525	Primary	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
	1200_QC100_201221	21/12/2020	ES2045525	Intralab Duplicate	4	5.85	23	146	7	<1	<1	7	0.28	0.23	5	<0.1	3	<1	2	<1	<1
	1200_QC200_201221	21/12/2020	AECO006/210106	Interlab Duplicate	4.6	6.1	19	180	<5	<5	<5	-	<5	<5	4	<0.1	2.6	3.4	1.8	0.6	3
SW075	1200_SW075_201215	15/12/2020	ES2045382	Primary	1	5.91	24	<5	8	<1	<1	8	0.3	0.18	5	<0.1	3	<1	1	<1	<1
SW086	1200_QC100_200406	6/04/2020	ES2012098	Intralab Duplicate	2	5.4	18	<5	<1	<1	<1000	<1	0.11	0.13	4	<0.1	3	<1	<1	<1	<1
	1200_SW086_200406	6/04/2020	ES2012098	Normal	1	5.3	14	<5	<1	<1	<1000	<1	0.11	0.13	4	<0.1	3	<1	<1	<1	<1
	1200_SW086_201215	15/12/2020	ES2045382	Primary	<1	5.83	14	<5	6	<1	<1	6	0.2	0.09	3	<0.1	2	<1	<1	<1	<1
SW091	1200_SW091_200406	6/04/2020	ES2012098	Normal	1	5.4	16	<5	<1	<1	<1000	<1	0.11	0.13	4	<0.1	3	<1	<1	<1	<1
	1200_SW091_201215	15/12/2020	ES2045382	Primary	<1	6.58	24	<5	12	<1	<1	12	0.35	0.22	4	<0.1	4	<1	1	<1	<1
SW123	1200_SW123_200406	6/04/2020	ES2012098	Normal	1	5.3	12	<5	<1	<1	<1000	<1	0.06	0.09	2	<0.1	2	<1	<1	<1	<1
	1200_SW123_201215	15/12/2020	ES2045382	Primary	<1	6.02	34	<5	10	<1	<1	10	0.28	0.46	3	<0.1	4	<1	<1	<1	11

Notes:
PQL: Practical Quantitation Limits
mg/L: milligram per Litre
µg/L: micrograms per Litre

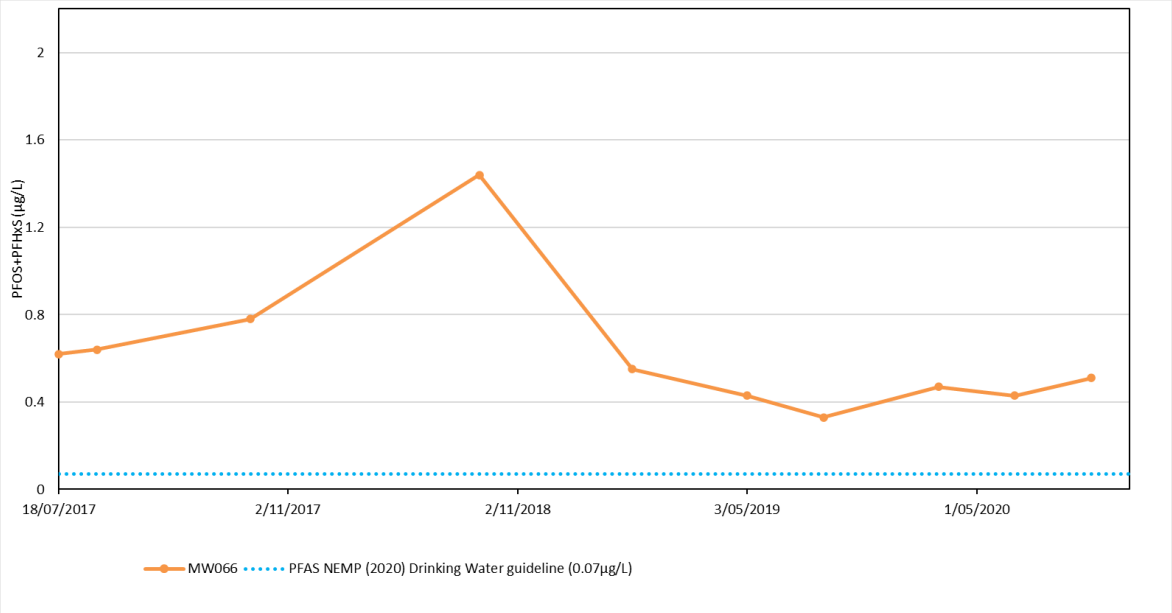
Table T7
Historical Sediment PFAS Results
PFAS OMP
Department of Defence - Robertson Barracks

				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	PFTeDA	PFTrDA	PFUnDA	Sum of PFAS	Sum of PFOS and PFHxS	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	0.0001	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	**Field ID**	**Sample Date**	**Lab Report**																														
On-Base Locations																																	
SD001	**SD001**	**4/10/2017**	**ES1725169**	0.0007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0005	ND	ND	ND	ND	ND	ND	0.0006	ND	ND	ND	ND	ND	ND	0.0083	0.0072	0.0072	ND	ND
	SD001	**2/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0035	0.0032	0.0032	ND	ND
	SD001	**1/05/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0015	0.0015	0.0015	ND	ND
	1200_SD001_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SD007	**SD007**	**10/10/2017**	**ES1725354**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SD007	**2/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SD007	**1/05/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD007_20040	**6/04/2020**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD007_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SD023	**SD023**	**7/10/2017**	**ES1725233**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SD023	**3/02/2018**	**ES1803868**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SD023	**1/05/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD023_20040	**6/04/2020**	**ES2012097**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD023_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SD028	**SD028**	**9/10/2017**	**ES1725233**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0006	0.0003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0026	0.0015	0.0015	0.0002	ND
	SD028	**2/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0005	ND	ND	ND	ND	0.0008	0.0003	0.0003	ND	ND
	SD028	**1/05/2019**	**ES2012097**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0004	0.0004	0.0004	ND	ND
	1200_SD028_20040	**6/04/2020**	**-**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	0.0009	0.0009	ND	ND
	1200_SD028_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0005	0.0005	0.0005	ND	ND
SD059	**SD059**	**7/10/2017**	**ES1725233**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	ND	ND	ND
	SD059	**1/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0002	0.0002	0.0002	ND	ND
	SD059	**1/05/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD059_20040	**6/04/2020**	**ES2012097**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0002	0.0002	0.0002	ND	ND
	1200_SD059_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Off-Base Locations																																	
SD075	**SD075**	**17/10/2017**	**ES1725949**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0014	0.0014	0.0014	ND	ND
	SD075	**2/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0003	0.0003	0.0003	ND	ND
	SD075	**23/05/2018**	**ES1814996**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0014	0.0014	0.0014	ND	ND
	SD075	**30/04/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0007	0.0007	0.0007	ND	ND
	1200_SD075_20040	**6/04/2020**	**ES2012097**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0007	0.0007	0.0007	ND	ND
	1200_SD075_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SD086	**SD086**	**19/10/2017**	**ES1726436**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0008	0.0008	0.0008	ND	ND
	SD086	**30/04/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD086_20040	**6/04/2020**	**ES2012097**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SD086_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SD091	**SD091**	**19/10/2017**	**ES1726436**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	0.0012	0.001	ND	0.0002
	SD091	**1/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	ND	ND	ND	ND	ND	0.0027	0.0017	0.0017	ND	ND
	SD091	**30/04/2019**	**ES1912855**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0002	0.0002	0.0002	ND	ND
	1200_SD091_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SD123	**SD123**	**1/02/2018**	**ES1803862**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0006	ND	ND	ND	ND	ND	ND	ND	0.0078	0.0082	0.0068	ND	0.0004
	SD123	**22/05/2018**	**ES1814996**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0002	ND	ND	0.0004	ND	ND	ND	ND	0.0028	0.0022	0.0018	ND	0.0004
	1200_SD123_20040	**6/04/2020**	**ES2012097**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	0.0003	ND	ND	ND	0.0007	0.0004	0.0004	ND	ND	-
	1200_SD123_21041	**15/05/2021**	**ES2114376**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0002	ND	ND	ND	ND

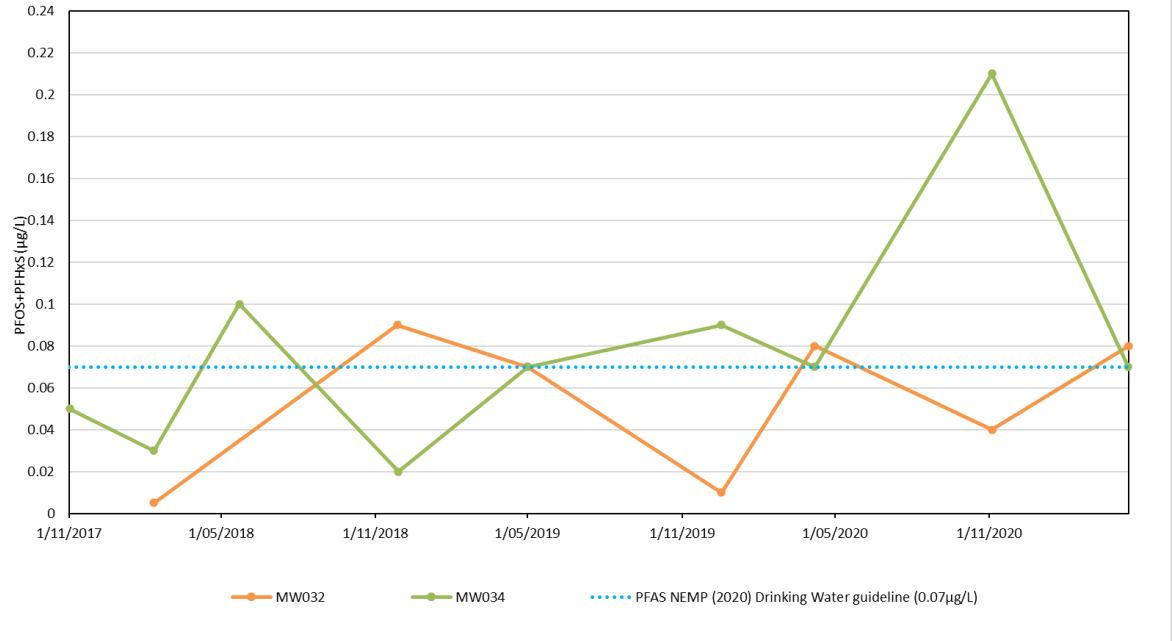
Notes
PQL: Practical Quantitation Limits
µg/L: micrograms per Litre
ND: No Detect above PQL

Appendix C

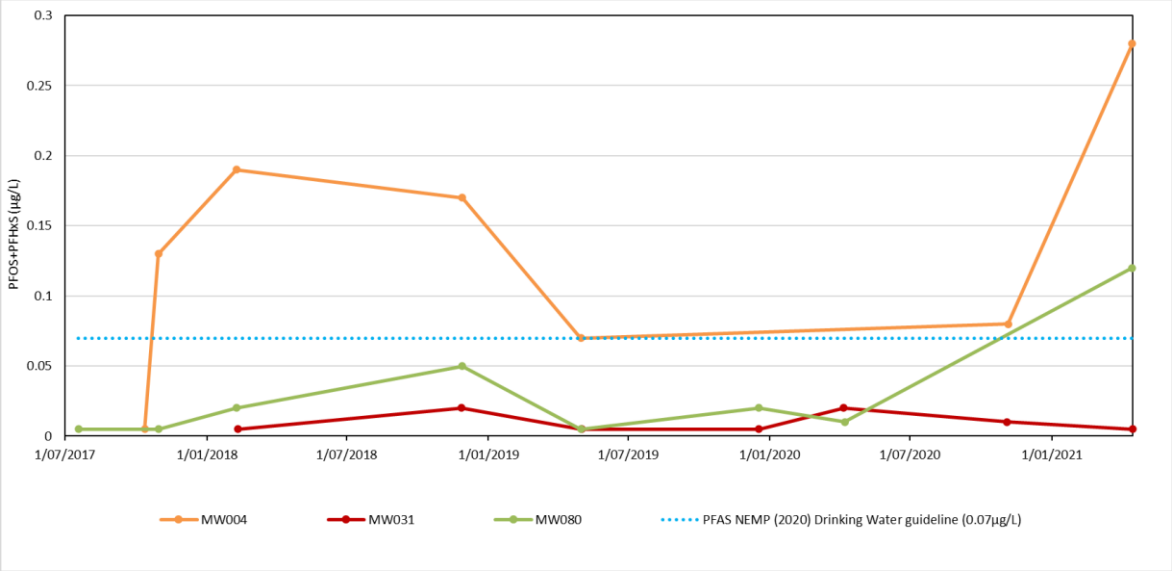
Charts and Plots



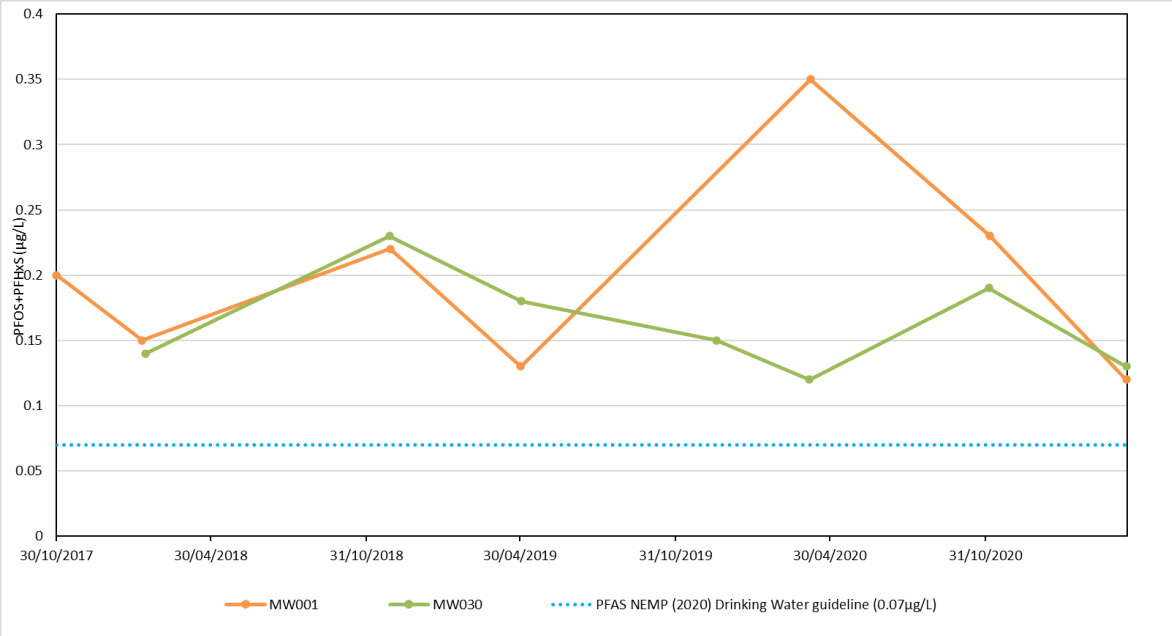
Graph 1A.1 PFOS+PFHxS (µg/L) MW066 from Source Zone 1.



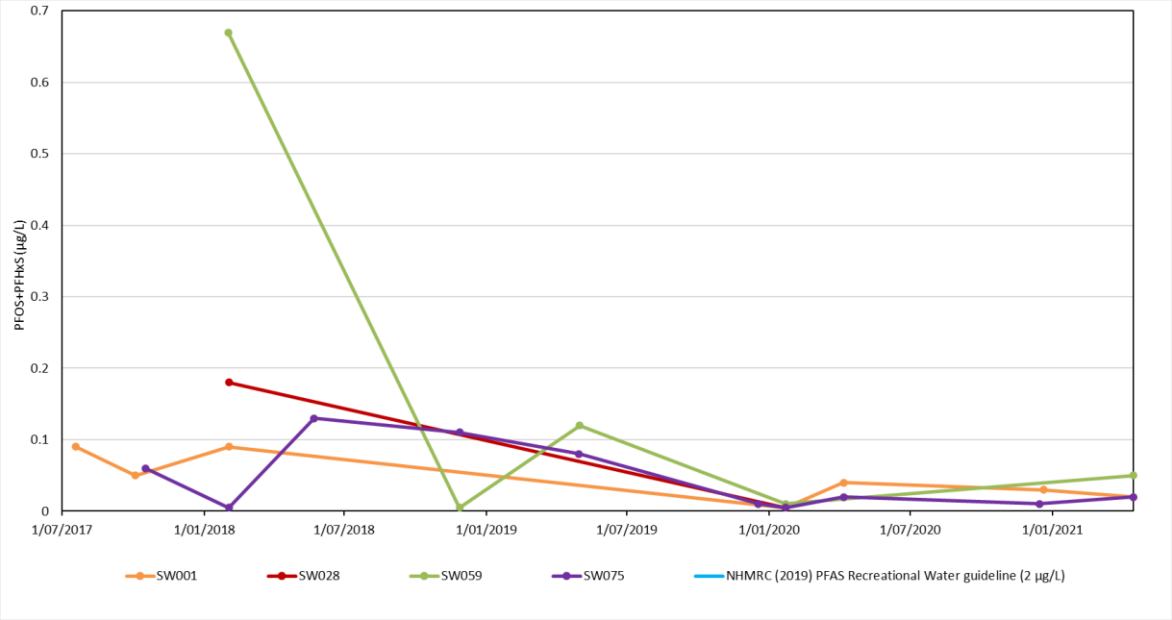
Graph 1B.1 PFOS+PFHxS (µg/L) MW032, and MW034 from Northern Bores.



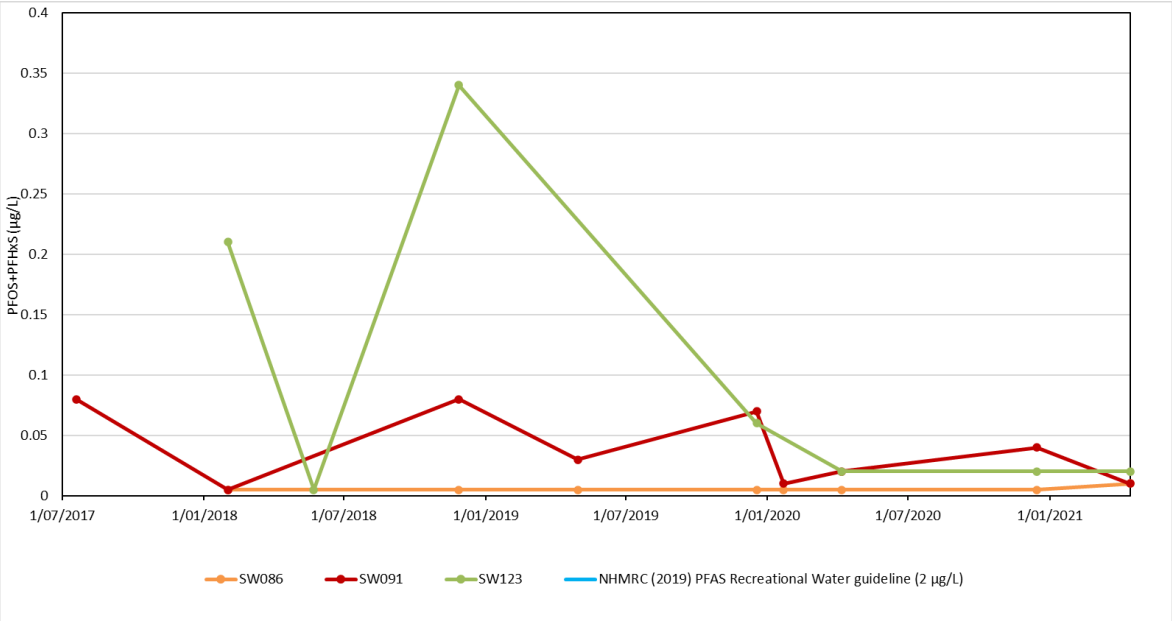
Graph 1C.1 PFOS+PFHxS (µg/L) MW004, MW031, and MW080 from Source Zone 2 and 3.



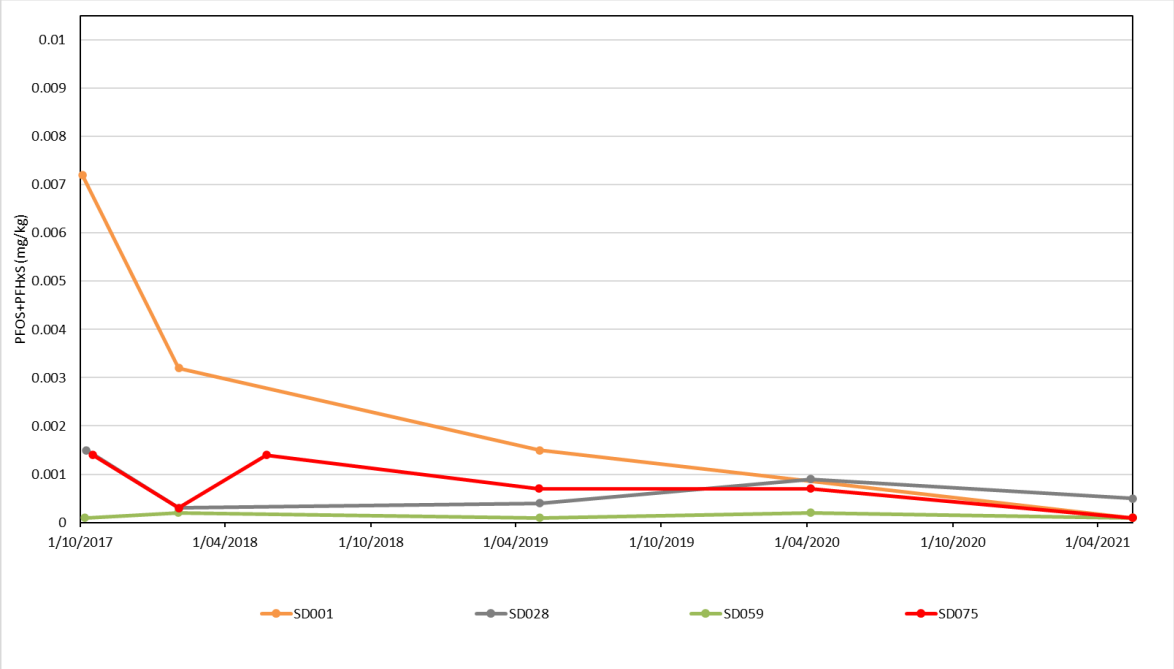
Graph 1D.1 PFOS+PFHxS (µg/L) MW001, and MW030 from Southern Bores.



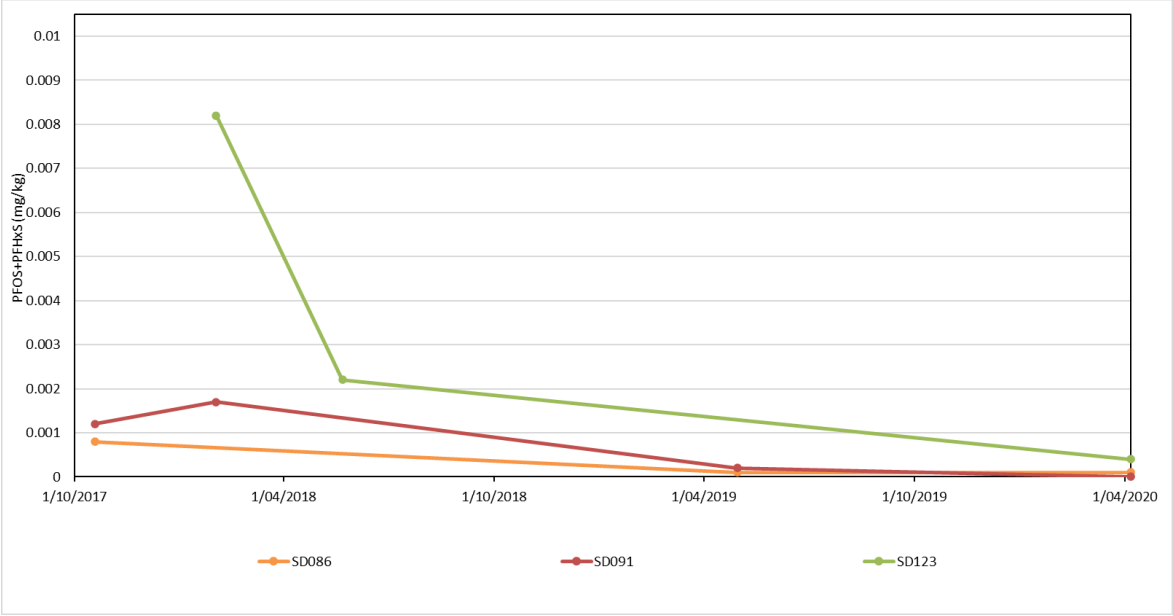
Graph 2A.1 PFOS+PFHxS (µg/L) SW001, SW028, SW059, and SW075 from On-Base SW.



Graph 2B.1 PFOS+PFHxS (µg/L) SW086, SW091, and SW123 from CTA SW.



Graph 3A.1 PFOS+PFHxS (mg/kg) SD001, SD028, SD059, and SD075 from On-Base.



Graph 3A.2 PFOS+PFHxS (mg/kg) SD086, SD091, and SD123 from CTA.

Appendix D

SAQP

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PFAS OMP - Robertson BarracksPFAS OMP - Robertson Barracks

Department of Defence

21-Jan-2021

Doc No. 60612561_OMP_Robertson Barracks_SAQP_20190102960612561_O

Sampling Analysis and Quality Plan

Sampling Analysis and Quality Plan

Client: Department of Defence

ABN: 68 706 814 312

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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 three 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) 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.

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 the three year monitoring period (2019 to 2022) as detailed in the Site OMP.

Table 1 Scope of Works

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	6	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	6	Start-Wet season (undertaken as soon as practicable after a first flush rain event, nominally December/January), and end-Wet season (April/May),
Sediment (on-Base and off-Base)	9 monitoring locations	Standard PFAS Laboratory Suite	Annually	3	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 child care 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 km2), 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 HHRA 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 will be limited to groundwater, surface water and sediment at the frequencies defined in Section 4.0.
- The monitoring will occur over an initial period of 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 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 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*.
  - Department of Defence, 2016, *Routine Environment Water Quality Monitoring Manual*
  - 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 initial 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.
Field duplicates/Inter-lab duplicates	The 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 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 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, with the exception of those points of deviation presented in Section 4.17.

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, November/December

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

4.2 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 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 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.

4.3 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		
	North Eastern Boundary of site	MW034	UBIF		
Close Training Area	Thorngate Road – Northern Boundary	MW032	UBIF		
	Down gradient Source 1	MW023	UBIF		
	Across gradient Source	MW021	UBIF		
		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

4.4 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.

4.5 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 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		

Area	Description	Sampling Location (Surface Water / Sediment)	Sampling Frequency	Number of sampling locations
Close Training Area	Northern Drainage Line	SW123 / SD123		
	Milners Creek	SW086 / SD086 and, SW091 / SD091		
Southern Drainage Channel		SW075 / SD075		Off-Base (1 locations)

4.6 Sample Collection and Handling

4.6.1 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.	
Sample Collection Methodology	**Groundwater Monitoring Wells** 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** 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. It is likely that bore connections or head works will need to be removed to measure the bore and groundwater depth.	
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.	
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 suite using the standard levels of detection.	
Sampling Schedule	As per **Appendix A**.	
Minimum Sampling Volumes	**Bottle**	**Minimum Volume**
	General Chemistry Bottle (Green)	180mL
	DOC Vial (Purple)	40mL
	PFAS Bottle (Grey)	5mL
	Water Analysis	
	pH	20mL
	TDS	40mL
	TSS	40mL
	Major Cations	10mL
	Alkalinity	50mL
	Sulphate	10mL
	Chloride	10mL

Item	Details
Sampling Schedule	The monitoring will include 6 bi-annual monitoring events with sampling completed November/December (Q4) and March/April (Q2), corresponding to end of Dry season and end of Wet season.

4.6.2 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 to be collected using a sample pole immediately below the water surface to minimise collection of sediment or floating materials in the samples. At each location, a new, laboratory supplied container should be lowered into the water with the cap immediately applied once the container is full.
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.
Field Parameters	Temperature, EC, DO, ORP, pH and observations of water quality will be recorded for all samples.
Sample Analysis	All primary samples will be submitted for PFAS extended suite using the standard levels of detection.
Sampling Schedule	The monitoring will include 6 bi-annual monitoring events with sampling completed November/December (Q4) and March/April (Q2), corresponding to end of Dry season and end of Wet season.

4.6.3 Sediment Sampling

The sediment sampling methodology and schedule are presented in Table 9

Table 10 Surface Water 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 wearing fresh disposable nitrile gloves. Where this sampling methodology is not possible, a hand trowel or shovel must be used, decontaminated with laboratory supplied PFAS-free water and Liquinox® solution. .
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.
Sampling Schedule	The monitoring will include 3 annual monitoring events with sampling completed April/May (Q2), corresponding to end of Wet season.

4.6.4 Sample Handling and Transport to Laboratory

Groundwater, surface water and sediment samples will be placed directly into laboratory-supplied PFAS-free bottles or jars upon collection whilst wearing fresh disposable nitrile gloves. Where field and inter-lab duplicates are to be collected, AECOM field staff will attempt to reduce potential heterogeneity by dividing the sample collected between primary and duplicate bottles during sampling.

Once collected, all samples will be immediately placed on ice in eskies. 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), a National Association of Testing Authorities (NATA) accredited laboratory. The inter-laboratory duplicate samples will be analysed by Envirolab, 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.

4.7 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 N0. 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.

4.8 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 couriered directly to the secondary laboratory under a separate CoC for analysis.

4.9 Analytical Suite and Laboratory Analysis Methods

4.9.1 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).

4.9.2 Water and Sediment Samples

The primary contaminants of concern at the Site are defined as PFAS and referenced in Guidance Document E – Standard PFAS Analytical Suite for Detailed Site Investigations (Department of Defence, 2018a) and Section 2.4 of the OMP. Other non-PFAS contaminants are not considered under this investigation unless determined necessary to supplement new and existing data.

In addition to the PFAS analytes, the following general chemistry parameters will be tested for a representative sub-set (a minimum of 20 percent of samples) of groundwater, surface water and sediment samples:

- Dissolved Organic Carbon (DOC) (water samples) or Total Organic Carbon (TOC) (sediment samples);
- Total Suspended Solids (TSS), and
- Major ions (chloride, sulphate, bicarbonate, carbonate, calcium, magnesium, sodium and potassium).

Selected groundwater and surface water sample locations are presented in

Table 11 and sediment samples presented in Table 12.

Table 11 Sub-set of groundwater and surface water samples to be analysed for general chemistry and DOC

Location Description		Relevant Sampling Location Code	
Groundwater			Aquifer*
Robertson Barracks	Source area	MW004	UBIF
		MW004D	LBIF
	Upgradient of source area	MW012	UBIF
		MW012D	LBIF
	Downgradient of source area	MW021	UBIF
		MW021D	LBIF
Shoal Bay Receiving Station	Abstraction bores	MW112 and MW113	
Surface Water			
Robertson Barracks	On-base drainage line, South east boundary	SW001	
	On-base drainage line, South west boundary	SW007	
	On-base drainage line, Eastern boundary	SW059	
Close Training Area	Northern Drainage Line	SW123	
	Milners Creek	SW086	

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

Table 12 Sub-set of sediment samples to be analysed for general chemistry and TOC

Location Description		Relevant Sampling Location Code
Sediment		
Robertson Barracks	On-base drainage line, South east boundary	SD001
	On-base drainage line, South west boundary	SD007
	On-base drainage line, Eastern boundary	SD059
Close Training Area	Northern Drainage Line	SD123
	Milners Creek	SD086

4.10 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
SS	Sediment	Sediment	Sediment	1200_SS027_180630 Depth of sediment sample (where not surface) should be included.

4.10.1 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	
Blind duplicate (duplicate)	1200_QC1XX_YYMMDD
Inter-Laboratory duplicate (triplicate)	1200_QC2XX_YYMMDD
Quality assurance samples	
Rinsate	1200_QC3XX_YYMMDD
Field Blank	1200_QC4XX_YYMMDD

4.11 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.

4.12 Adopted Screening Criteria

PFAS screening values have been adopted for groundwater and surface water from the Defence OMP and are derived from the following documents:

- HEPA (2018) PFAS National Environmental Management Plan (NEMP)
- Department of Health (DoH), 2017. Health Based Guidance Values for PFAS for use in site investigations in Australia. April 2017 (FSANZ 2017).
- 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 the Table 16.

Table 16 Adopted groundwater and surface water screening values (µg/L)

Pathway	Compound	Criteria	Comment / Reference
Drinking water - groundwater	PFOS + PFHxS	0.07 µg/L	The values presented in the PFAS NEMP, 2018 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	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	In August 2019, NHMRC released guidance on the assessment of PFAS in surface water. 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 (2018) NEMP 99% species protection
		PFOA	19 µg/L	HEPA (2018) NEMP 99% species protection

Note: HEPA (2018) 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.

4.13 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 waste water or soil) will be managed and/or disposed of appropriately in accordance with Territory waste disposal requirements.

4.14 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.

4.14.1 Field 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.

4.14.2 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.

4.14.3 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 Fieldwork Documentation

4.15.1 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) and field water quality parameters (pH, EC, DO, ORP, temperature) 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.

4.15.2 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.

4.15.3 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.

4.15.4 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.

4.16 Reporting

4.16.1 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. 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:
    - Groundwater, surface water and sediment sampling forms including field water quality parameter measurements;
        i. Chain of custody forms;
        ii. Laboratory analytical certificates; and

iii. Equipment calibration certificates.

4.16.2 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.

4.16.3 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

4.17 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
3	Adoption of Revised Recreational Screening Criteria for PFOS+PFHxS 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 PFOS+PFHxS 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.

5.0 References

ANZECC& ARMCANZ (2000). *Australian and New Zealand guidelines for fresh and marine water quality*.

ANZECC&ARMCANZ (2000). *Australian guidelines for water quality monitoring and reporting*.

ASC NEPM, 2013. *Schedule B2. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedule B2 Guideline on Site Characterisation*.

ASC NEPM, 2013. *Schedule B4. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedule B4 Guideline on Site-Specific Health Risk Assessment Methodology*.

ASC NEPM, 2013. *Schedule B7. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedule B7 Guideline on Derivation of Health-Based Investigation Levels*.

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*.

Senversa (2018a). *Human Health and Ecological Risk Assessment Robertson Barracks* (D13412_RPT_Rev2_DSI) prepared for Department of Defence.

Senversa (2018b). *Detailed Site Investigation Robertson Barracks* (D13412_RPT_Rev3_DSI) prepared for Department of Defence.

Senversa (2018c). *PFAS Management Area Plan – Robertson Barracks* prepared for Department of Defence

Senversa (2019a). *Ongoing Monitoring Event – Dry season (Nov 2018)* (D13412_012_LTR RPT_Rev0) prepared for Department of Defence.

Senversa (2019a). *Ongoing Monitoring Report – Robertson Barracks Oct 2018 to May 2019* (D13412_013_RPT_OMR_REV1) prepared for Department of Defence.

Department of Defence, 2016. *Routine Environment Water Quality Monitoring Manual.*

Department of Defence, July 2018, Amended August 2019, *Defence Contamination Management Manual.*

Department of the Environment and Energy (2018), *PFAS National Environmental Management Plan (PFAS NEMP)*

Department of Health (DoH) (2017), *Health Based Guidance Values for PFAS for use in site investigations in Australia. April 2017* (FSANZ 2017).

Heads of EPAs Australia and New Zealand (HEPA) 2018. *PFAS National Environmental Management Plan*. January 2018

National Health and Medical Research Council (NHMRC) (2019). Guidance on PFAS in Recreational Water. August 2019

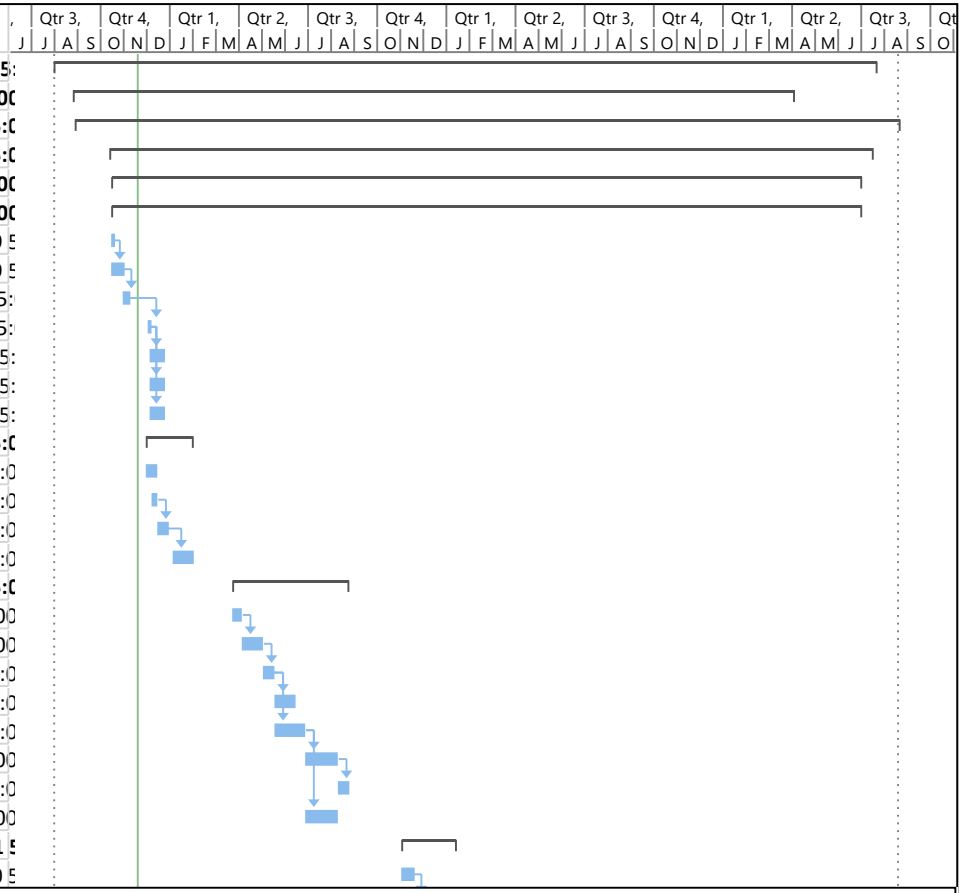
Department of Environment and Natural Resources*, Water Act 1992* (NT)

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

Appendix A

Schedule

	Task Name	Duration	Start	Finish
1	**SA/NT Regional Level Management**	**775 days**	**Wed 31/07/19**	**Tue 19/07/22 5:**
134	**RAAF Edinburgh**	**680 days**	**Mon 26/08/19**	**Fri 1/04/22 5:0**
179	**RAAF Tindal**	**777 days**	**Thu 29/08/19**	**Fri 19/08/22 5:**
268	**RAAF Darwin**	**719 days**	**Tue 15/10/19**	**Fri 15/07/22 5:**
334	**Robertson Barracks**	**708 days**	**Wed 16/10/19**	**Fri 1/07/22 5:0**
335	**PFAS OMP**	**708 days**	**Wed 16/10/19**	**Fri 1/07/22 5:0**
336	PFAS OMP- Request Issued	1 day	Wed 16/10/19	Wed 16/10/19 5
337	PFAS OMP- Request Submitted	10 days	Thu 17/10/19	Wed 30/10/19 5
338	PFAS OMP- Official Order Issued	5 days	Thu 31/10/19	Wed 6/11/19 5:
339	PFAS Site Kick Off Meeting	1 day	Wed 4/12/19	Wed 4/12/19 5:
340	Site Management Plan	14 days	Thu 5/12/19 8	Tue 24/12/19 5:
341	HSE Management Plan	14 days	Thu 5/12/19 8	Tue 24/12/19 5:
342	SAQP	14 days	Thu 5/12/19 8	Tue 24/12/19 5:
343	**Q4 2019 Sampling Event**	**45 days**	**Mon 2/12/19**	**Fri 31/01/20 5:0**
344	Stakeholder Notifications	10 days	Mon 2/12/19	Fri 13/12/19 5:0
345	Sampling Event	5 days	Mon 9/12/19	Fri 13/12/19 5:0
346	Laboratory Analysis	10 days	Mon 16/12/19	Fri 27/12/19 5:0
347	Factual Report	20 days	Mon 6/01/20	Fri 31/01/20 5:0
348	**Q2 2020 Sampling Event**	**110 days**	**Mon 23/03/20**	**Fri 21/08/20 5:0**
349	Stakeholder Notifications	10 days	Mon 23/03/20	Fri 3/04/20 5:0
350	Sampling Event	20 days	Mon 6/04/20	Fri 1/05/20 5:0
351	Laboratory Analysis	10 days	Mon 4/05/20	Fri 15/05/20 5:0
352	Factual Report	20 days	Mon 18/05/20	Fri 12/06/20 5:0
353	Interpretative Report & Comments	30 days	Mon 18/05/20	Fri 26/06/20 5:0
354	Community Engagement Event	30 days	Mon 29/06/20	Fri 7/08/20 5:0
355	Engagement Summary Report	10 days	Mon 10/08/20	Fri 21/08/20 5:0
356	***PFAS OMP 2020 Annual Review***	30 days	Mon 29/06/20	Fri 7/08/20 5:0
357	**Q4 2020 Sampling Event**	**50 days**	**Tue 3/11/20 8**	**Mon 11/01/21 5**
358	Stakeholder Notifications	10 days	Tue 3/11/20 8	Mon 16/11/20 5



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Date: Tue 19/11/19 12:59 PM

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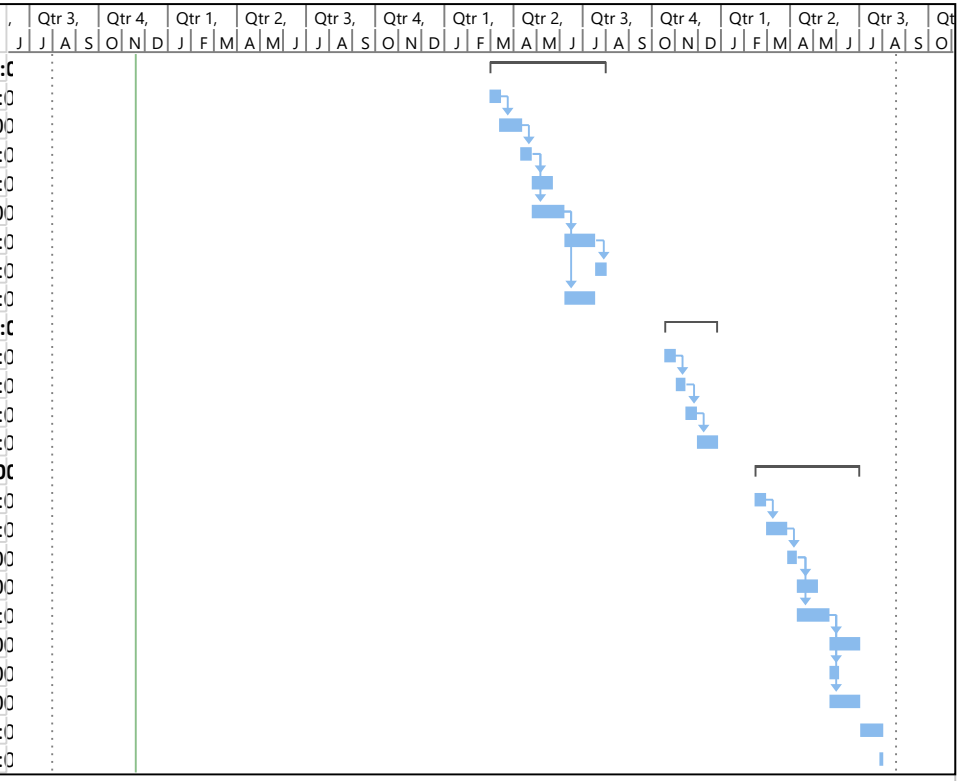
Split	Manual Task	External Milestone	
Milestone	Duration-only	Deadline	
Summary	Manual Summary Rollup	Progress	
Project Summary	Manual Summary	Manual Progress	
Inactive Task	Start-only		
Inactive Milestone	Finish-only		

	Task Name	Duration	Start	Finish
362	**Q2 2021 Sampling Event**	**110 days**	**Mon 1/03/21**	**Fri 30/07/21 5:0**
363	Stakeholder Notifications	10 days	Mon 1/03/21	Fri 12/03/21 5:0
364	Sampling Event	20 days	Mon 15/03/21	Fri 9/04/21 5:0
365	Laboratory Analysis	10 days	Mon 12/04/21	Fri 23/04/21 5:0
366	Factual Report	20 days	Mon 26/04/21	Fri 21/05/21 5:0
367	Interpretative Report & Comments	30 days	Mon 26/04/21	Fri 4/06/21 5:0
368	Community Engagement Event	30 days	Mon 7/06/21	Fri 16/07/21 5:0
369	Engagement Summary Report	10 days	Mon 19/07/21	Fri 30/07/21 5:0
370	***PFAS OMP 2021 Annual Review***	30 days	Mon 7/06/21	Fri 16/07/21 5:0
371	**Q4 2021 Sampling Event**	**50 days**	**Mon 18/10/21**	**Fri 24/12/21 5:0**
372	Stakeholder Notifications	10 days	Mon 18/10/21	Fri 29/10/21 5:0
373	Sampling Event	10 days	Mon 1/11/21	Fri 12/11/21 5:0
374	Laboratory Analysis	10 days	Mon 15/11/21	Fri 26/11/21 5:0
375	Factual Report	20 days	Mon 29/11/21	Fri 24/12/21 5:0
376	**Q2 2022 Sampling Event**	**100 days**	**Mon 14/02/22**	**Fri 1/07/22 5:00**
377	Stakeholder Notifications	10 days	Mon 14/02/22	Fri 25/02/22 5:0
378	Sampling Event	20 days	Mon 28/02/22	Fri 25/03/22 5:0
379	Laboratory Analysis	10 days	Mon 28/03/22	Fri 8/04/22 5:0
380	Factual Report	20 days	Mon 11/04/22	Fri 6/05/22 5:0
381	Interpretative Report & Comments	30 days	Mon 11/04/22	Fri 20/05/22 5:0
382	Community Engagement Event	30 days	Mon 23/05/22	Fri 1/07/22 5:0
383	Engagement Summary Report	10 days	Mon 23/05/22	Fri 3/06/22 5:0
384	***PFAS OMP 2021 Annual Review***	30 days	Mon 23/05/22	Fri 1/07/22 5:0
385	Handover OMPs	20 days	Mon 4/07/22	Fri 29/07/22 5:0
386	Contract End Date	1 day	Fri 29/07/22 8	Fri 29/07/22 5:0



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Program_NTSA_20191028
Date: Tue 19/11/19 12:59 PM

Task		Inactive Summary		External Tasks	
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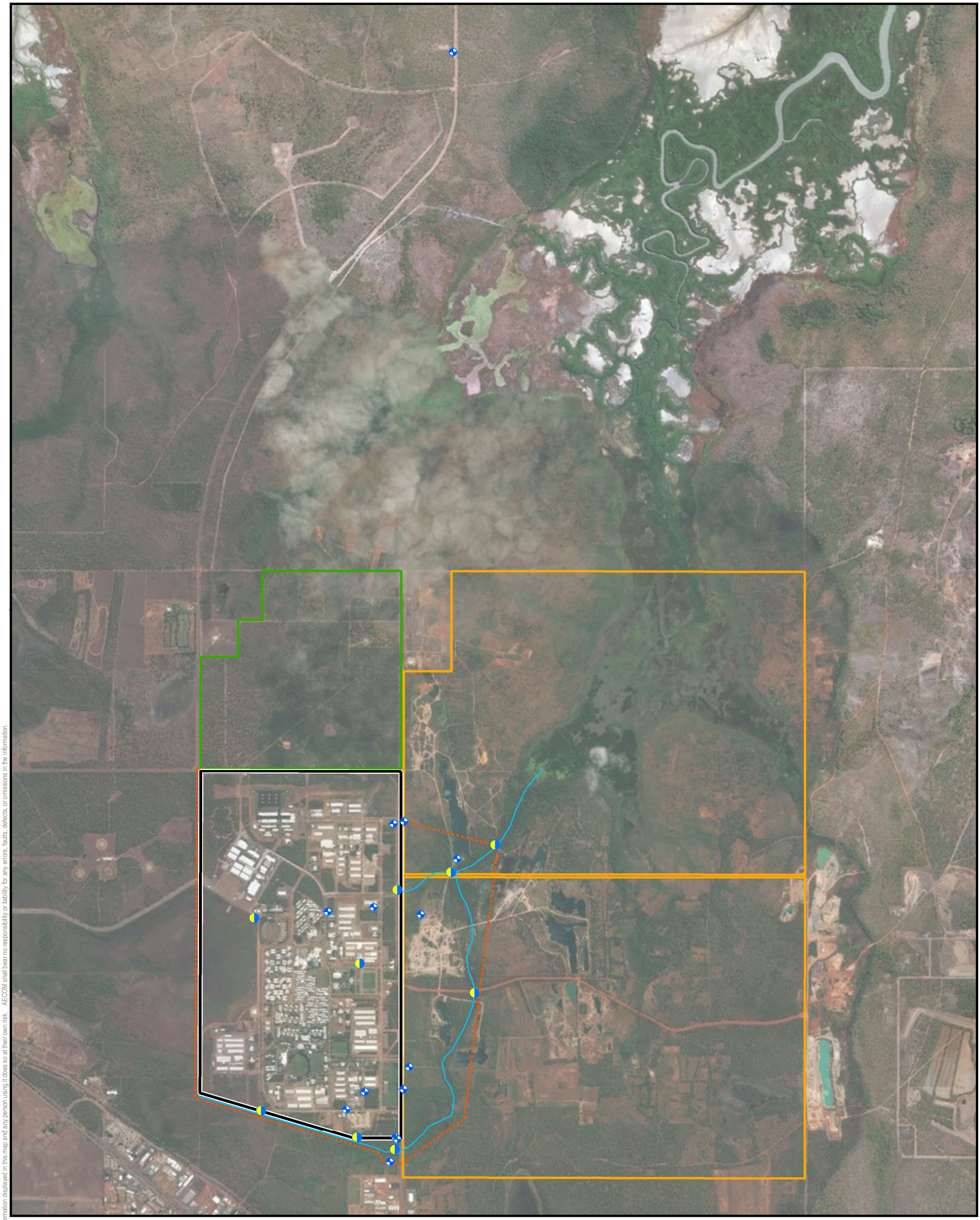
Milestone		Duration-only		Deadline	
Summary		Manual Summary Rollup		Progress	
Project Summary		Manual Summary		Manual Progress	
Inactive Task		Start-only			
Inactive Milestone		Finish-only			

Appendix B

Figures



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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

0 250 500 1,000

metres

1:27,419 (when printed at A3)

LEGEND

- Groundwater sample location
- Surface Water and Sediment sample locations
- Watercourse
- Highway
- Road
- Track
- Monitoring Area

Site Layout

- Robertson Baracks
- Close Training
- Marksmanship Training Range

Data sources:

Department of Defence
ROBERTSON BARRACKS DARWIN
SAMPLING ANALYSIS QUALITY PLAN

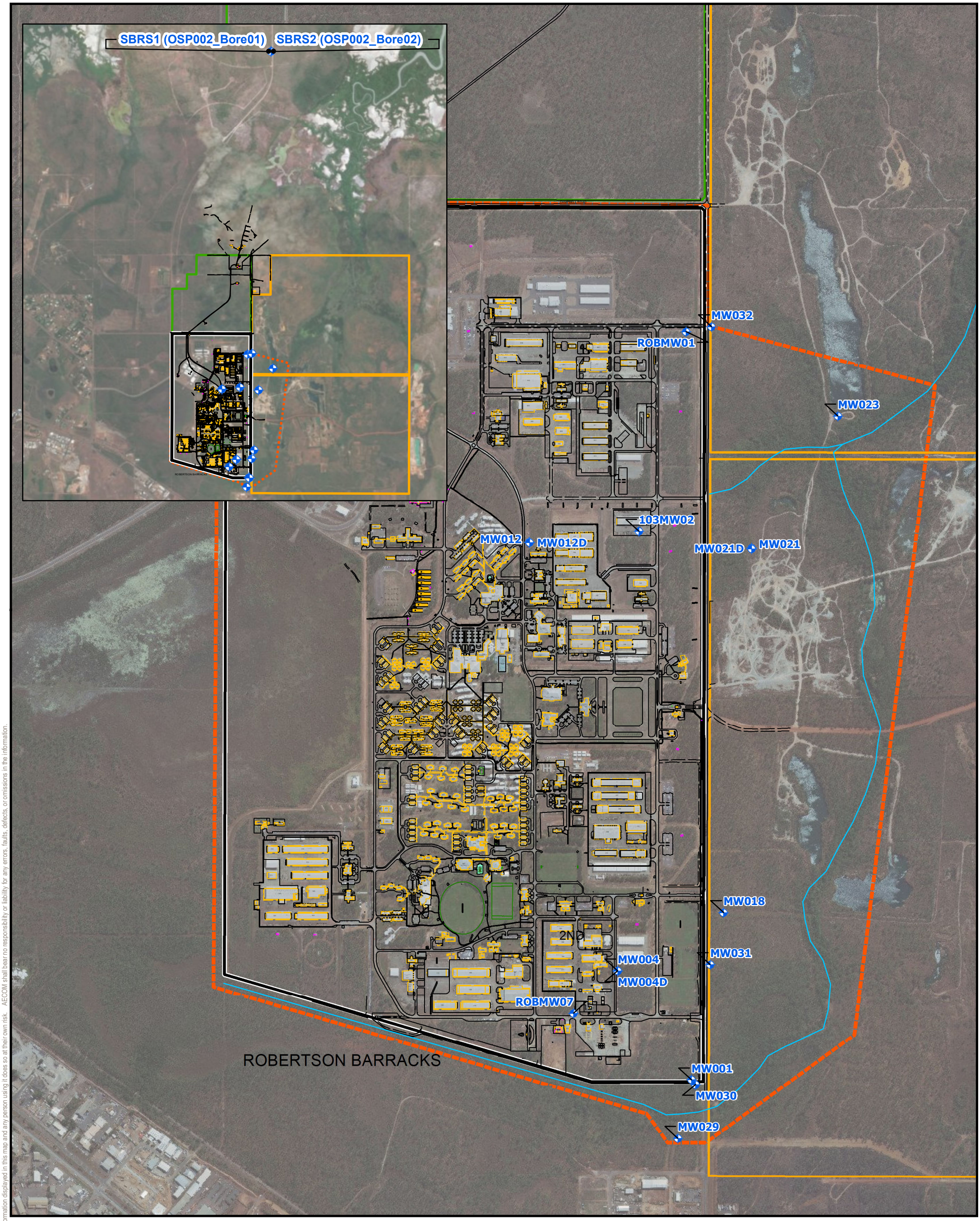
SITE LOCATION

PROJECT ID	60612561
CREATED BY	
LAST MODIFIED	Treasurea - 19 Nov 2019
VERSION:	1

Map 1

Filename: \\autsv1fp001\GIS\TSV_GIS\Projects\60612561_Darwin_Def\02_MXDs\RoboBarracks\DRAFT B\60612561_F01_RobertsonBarracks_OverallLocationsA3L.mxd

A3 size



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:11,500 (when printed at A3)

LEGEND

- Groundwater sample location
- Watercourse
- Highway
- Road
- Track
- Monitoring Area

Site Layout

- Robertson Baracks
- Close Training
- Marksmanship Training Range

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

Department of Defence
ROBERTSON BARRACKS DARWIN
SAMPLING ANALYSIS QUALITY PLAN

ON-GOING MONITORING PLAN
GROUNDWATER

PROJECT ID	60612561
CREATED BY	
LAST MODIFIED	Treasurea - 09 Dec 2019
VERSION:	2

Map 2

Filename: \\autsv1fp001\GIS\TSV_GIS\Projects\60612561_Darwin_Def\02_MXDs\RoboBarracks\60612561_F02_RobertsonBarracks_GroundwaterLocationsA3L_191209.mxd

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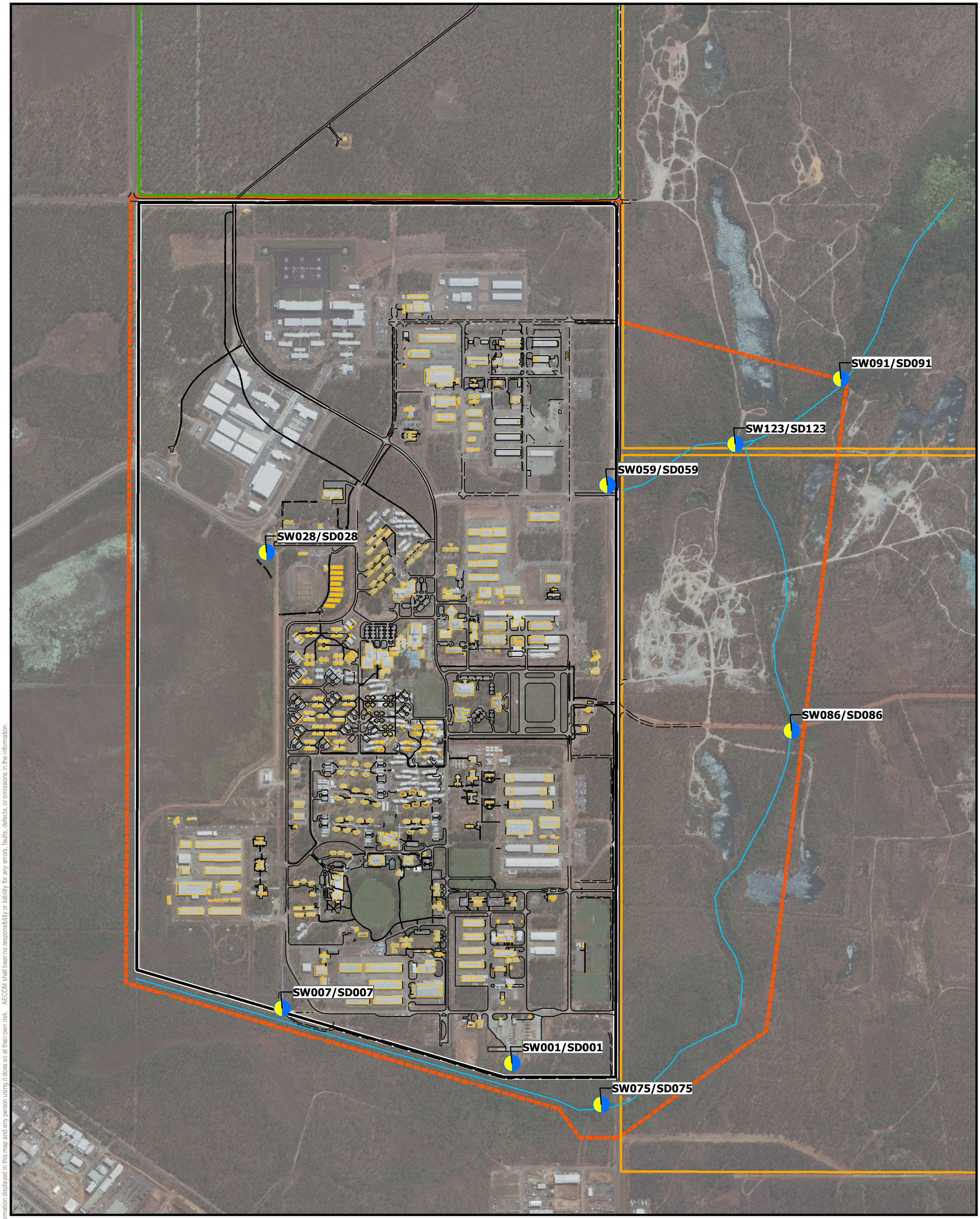

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AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 52

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metres

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LEGEND

- Sediment
- Robo_Streams
- Watercourse
- Highway
- Road
- Track
- Monitoring Area

Site Layout

- Robertson Baracks
- Close Training
- Marksmanship Training Range

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

Department of Defence
ROBERTSON BARRACKS DARWIN
SAMPLING ANALYSIS QUALITY PLAN

SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

PROJECT ID	60612561
CREATED BY	
LAST MODIFIED	Treasurea - 10 Dec 2019
VERSION:	1

Map
3

Filename: \\autsv1fp001\GIS\TSV_GIS\Projects\60612561_Darwin_Def\02_MXDs\RoboBarracks\60612561_F03_RobertsonBarracks_SurfacewaterLocationsA3L.mxd

A3 size

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
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

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	South east	715217.25	8622868.93
SW007	SD007	Robertson Barracks	South west	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

Appendix E

2020-2021 Factual Reports

AECOM Imagine it. Delivered.

Department of Defence
08-Mar-2021

Sampling Event Factual Report, November and December 2020

PFAS OMP - Robertson Barracks

Sampling Event Factual Report, November and December 2020

PFAS OMP - Robertson Barracks

Client: Department of Defence

ABN: 68706814312

Prepared by

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ABN 20 093 846 925

08-Mar-2021

Job No.: 60612561

Quality Information

Document	Sampling Event Factual Report, November and December 2020
Ref	60612561
Date	08-Mar-2021
Prepared by	[redacted]
Reviewed by	[redacted]

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	21-Jan-2021	Draft for Review	[redacted] Project Manager	[redacted]
0	08-Mar-2021	Final	[redacted] Project Manager	

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1.0 Introduction

1.1 General

AECOM Australia Pty Ltd (AECOM) has been engaged by the Department of Defence (Defence) to implement the per- and poly-fluoroalkyl substances Ongoing Monitoring Program (PFAS OMP) at the Robertson Barracks (the 'Site') in the Northern Territory. The location of the Site and Management Area is shown in **Figure 1** in **Appendix B**. The OMP (Defence, 2019a) for the Site outlines the requirement to complete biannual groundwater and surface water sampling.

Following each sampling event, a sampling event factual report will be prepared. Annual interpretative reports will be prepared following the completion of each 12-month sampling period.

1.2 Objectives

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 (Defence, 2018).

The data collected will assist in the timely identification of risks and inform Defence's approach to the management of PFAS, including updates and revisions to the PFAS Management Area Plan (PMAP) (Defence, 2019b).

The purpose of this PFAS OMP factual report is to summarise the scope of works and findings for the November and December 2020 groundwater and surface water sampling events, conducted in accordance with the Sampling and Analysis Quality Plan (SAQP) (AECOM, 2020).

2.0 Scope of Work

The biannual sampling event was completed in general accordance with the SAQP (AECOM, 2020). In summary, the scope of works completed included:

- Gauging of groundwater level in monitoring wells prior to collection of samples (refer to Table 1 below, and **Figure 2** in **Appendix B** for specific locations).
- Collection of groundwater samples in 14 existing monitoring wells using Hydrasleeves™ and collection of groundwater samples (first flush and formation samples) from two abstraction bores. It is noted that samples from two monitoring wells could not be collected during this sampling event; refer to Table 5 for more details.
- Collection of seven surface water samples in December 2020 (refer to Table 2 below, and **Figure 2** in **Appendix B** for specific locations) during a first flush event for the Wet Season. It is noted that samples from two locations could not be collected during this sampling event due to water availability. Please refer to Table 6 for further details.
- Collection of Quality Assurance (QA) and Quality Control (QC) samples, including field duplicates and triplicates samples at a rate of 1 in 10 primary samples, and collecting one rinsate and field blank sample per ten primary samples obtained each fieldwork day.
- Analysis of samples for the following:
  - all samples for the PFAS suite at the standard limit of reporting (LOR).
  - 20% of groundwater and surface water samples for major cations (sodium, calcium, magnesium and potassium) and anions (chlorine, sulphate, bicarbonate, carbonate), total suspended solids (TSS) and dissolved organic carbon (DOC).
- Data management of the OMP field and laboratory data in Defence ESdat database.
- Preparation of this Sampling Event Factual Report.

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	
	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	

*Location not sampled. Refer to Table 5 for further details

Table 2 Surface Water Sampling Locations

Area	Description	Sampling Locations	Number of Locations	Total
On Site	On-base drainage line, South east boundary	SW001	1	5
	On-base drainage line, South west boundary	SW007	1	
	On-base drainage line, Central	SW023*, SW028*	2	
	On-base drainage line, Eastern boundary	SW059	1	
Off Site	Northern Drainage Line	SW123	1	4
	Milner's Creek	SW086, SW091	2	
	Southern Drainage Channel	SW075	1	

*Location not sampled in December 2020. Refer to Table 6 for further details

2.1 Sampling Methodology

The methodology adopted for the November and December 2020 biannual groundwater and surface water sampling was in accordance with the SAQP (AECOM, 2020) and is summarised below:

Table 3 Sampling Methodology

Item	Details
Groundwater Water and Surface Water Sampling Methodology	
Groundwater gauging	The depth to groundwater was measured in each monitoring well immediately prior to collection of groundwater samples using an interface probe.
Field parameters	Field parameters were measured for all groundwater and surface water locations. Samples were decanted into the YSI collection cup and parameters recorded within 5 minutes, parameters recorded include temperature, electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP), pH and observations of water quality.
Water sampling methodology	Groundwater samples were collected from accessible monitoring wells using no-purge methodology HydraSleeves™, with the exception of abstraction bores MW113 and MW112. HydraSleeves™ were installed within the screened interval of the wells for a minimum of 12 hours prior to the sampling round. This was based on a review of the well construction log. Once sampling was completed, new HydraSleeves™ were deployed at the screened interval depth in preparation for the next sampling round. Abstraction bore groundwater samples were collected by placing the laboratory sample bottle beneath the tap and the tap slowly opened to collect the “first flush” of water. An additional "formation" sample was collected following flushing of the bore for approximately 3 mins. Surface water samples were collected from approximately 0.1 meters below the water surface to minimise collection of sediment or floating materials in the samples. At each location, a new, laboratory supplied container was lowered into the water, using an aluminium sampling pole, with the cap immediately applied once the container was full.
QAQC Samples	Field QA/QC samples collected included intra-laboratory duplicate and inter-laboratory duplicate samples (i.e. splits), field blanks 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 detailed in **Section 3.0**. 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**.

2.2 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 include the following:

- Department of Health (DoH), 2017. Health Based Guidance Values for PFAS for use in site investigations in Australia. April 2017 (FSANZ 2017).
- PFAS National Environmental Management Plan Version 2.0 (PFAS NEMP 2.0), (HEPA 2020).
- 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).

The screening criteria which have been adopted are presented in Table 5 below.

Table 4 Summary of Adopted Screening Criteria

Pathway	Compound	Criteria	Comment/Reference
Human Health Receptors			
Drinking water - groundwater	PFOS + PFHxS	0.07 µg/L	The values presented in the PFAS NEMP, 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*'.
	PFOA	0.56 µg/L	
Recreational use – surface water	PFOS + PFHxS	2 µg/L	In August 2019, NHMRC released guidance on the assessment of PFAS in surface water. 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.
	PFOA	10 µg/L	

Pathway	Compound	Criteria	Comment/Reference
Ecological Receptors			
Freshwater (99% species protection values)	PFOS PFOA	0.00023 µg/L 19 µg/L	The values are from the PFAS NEMP, 2020 which endorsed the Australian and New Zealand Guidelines for Fresh and Marine Water Quality – draft default guideline values. AECOM understands that these guidelines are currently being reviewed and will consider the appropriateness of considering any future revision. 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.

2.3 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, 2020).

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

Data validation procedure 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 this report.

All data collected during this event has been reviewed and uploaded to the Defence ESdat database in accordance with DCMM requirements.

3.0 Field Observations and Results

3.1 Groundwater

3.1.1 Field Observations and Field Measurements

Table 5 Groundwater Observations and Field Measurements

Compound	Criteria
Fieldwork Dates	The groundwater sampling was completed on 4 November 2020. The results are summarised in the following sections.
Access and Sample Collection	All monitoring wells and bores were accessible and able to be sampled, with the exception of the following: Monitoring wells MW023 and MW080 presented as dry.
Monitoring Well Network Condition	The following monitoring wells were found to be damaged during the fieldworks: • MW066 had a damaged Gatic cover but was still able to be sampled. Of the two monitoring wells reported blocked in the April 2020 sampling event (MW001 and MW004), both were able to be successfully unblocked with a metal bailer. Hydrasleeves were deployed at both locations at the time blockages were resolved (3 November 2020), prior to the November 2020 sampling event. The locations were gauged and sampled during the November 2020 event.
Contamination Observations	No visible or olfactory indications of contamination were observed during the sampling.
Depth to Groundwater and flow direction	Depth to groundwater ranged from 2.05 (MW030) to 7.94 (MW012D) metres below top of casing (mbtoc). Groundwater elevations in the shallow aquifer unit ranged between 18.0 (MW021) and 30.7 (MW012) metres Australian Height Datum (mAHD). Groundwater gauging data is presented in **Table T1** in **Appendix A**. Inferred groundwater contours and groundwater flow directions at the site in November 2020 are shown on **Figure 3** in **Appendix B**. Inferred groundwater contouring suggests that groundwater in the shallow aquifer unit drains to the north east towards the Close Training Area (CTA) and towards the southern end of the barracks draining towards the catchment of Milner's Creek. Overall data is limited, and groundwater contouring will improve with additional data from future monitoring programs.
Geochemical Parameters	Groundwater geochemical parameters were measured prior to collecting groundwater samples. These readings are presented in **Table T1** in **Appendix A**, and are summarised below: • Dissolved oxygen ranged from 0.00 mg/L (MW029) to 4.46 mg/L (MW112) indicating relatively low dissolved oxygen levels • Electrical conductivity ranged from 39.3 µS/cm (MW018) to 385.6 µS/cm (MW112) indicating low salinity • pH ranged from 4.48 (MW066) to 7.81 (MW021) indicating slightly acidic to neutral conditions • Redox (corrected) ranged from 177.4 mV (MW113) to 455.8 mV (MW066) indicating oxidising to reducing conditions

3.1.2 PFAS Groundwater Analytical Results

The PFAS groundwater analytical results from the November 2020 sampling event are presented in **Table T2** in **Appendix A. Table T3** in **Appendix A** presents historical PFAS groundwater analytical results. There were no first-time detections above the limit of reporting or screening criteria.

3.1.3 Non-PFAS Groundwater Analytical Results

The non-PFAS groundwater analytical results from this sampling event are presented in **Table T4** in **Appendix A.**

3.2 Surface Water

3.2.1 Field Observations and Field Measurements

Table 6 Surface Water Observations and Field Measurements

Compound	Criteria
Fieldwork Dates	Surface water sampling was completed on 15 and 21 December 2020. The results for this event are summarised in the following sections.
Access and Sample Collection	Seven of the nine surface water sampling locations were able to be sampled in December 2020: • The surface water samples from SW023 and SW028 were not collected as the locations were dry.
Contamination Observations	No obvious visible signs of contamination were observed.
Rainfall	Rainfall reported above average in December, with 115.8mm reported within the area during the surface water sampling event in December 2020 (Darwin Airport weather station, 014015) (Bureau of Meteorology, 2020).
Surface Water Flow	During the December 2020 sampling event, the onsite drains were not flowing however, had evidence of recent flushing and pooling of water. Insufficient water was present at SW028 and SW023 to determine a flushing event. Milner's Creek (SW075) and associated southern drainage channel had moderate flows. Similarly, within the Close Training Area, Milner's creek was observed to have a moderate flow across all sampling locations.
Geochemical Parameters	Surface water geochemical parameters were measured directly before collecting surface water samples in December 2020. The readings are presented in **Table T5** in **Appendix A**, and are summarised below: • Dissolved oxygen ranged from 0.56 mg/L (SW059) and 6.0 mg/L (SW007). • Electrical conductivity ranged from 25.5 µS/cm (SW123) to 119.9 µS/cm (SW091). • pH ranged from 5.76 (SW086) to 8.4 (SW091) in pH results indicate slightly acidic to neutral conditions. • Redox (corrected) ranged from 284 mV (SW091) to 381.3 mV (SW075), indicating oxidizing conditions.

3.2.2 PFAS Surface Water Analytical Results

The PFAS surface water analytical results from the December 2020 sampling events are presented in **Table T6** in **Appendix A**. **Table T7** in Appendix A presents historical PFAS surface water analytical results. There were no first-time detections above the limit of reporting or screening criteria in the dataset.

3.2.3 Non-PFAS Surface Water Analytical Results

The non-PFAS surface water analytical results from this sampling event are presented in **Table T8** in **Appendix A**.

4.0 Summary and Next Sampling Events

4.1 Summary of Monitoring Event

The bi-annual monitoring event was completed at the Site and publicly accessible land within the Management Area on 4 November, 15 and 21 December 2020. The program included sampling of:

- groundwater from 16 monitoring wells and bores,
- surface water sampling at 7 locations, and

Table 7 below summarises the findings of the November and December 2020 sampling events and the recommended actions.

Table 7 Summary of Sampling Event

Item	Comment	Recommended Actions
Access to sampling locations	The following were accessed and able to be sampled: • 16 out of 18 monitoring wells • 7 out of 9 surface water locations Monitoring well MW023 and MW080 were dry. Surface water locations SW023 and SW028 were dry. The non-sampling of these locations is generally not considered critical to understanding the distribution of PFAS in groundwater and surface water in the Management Area. However, it is noted MW023 has been observed dry four out of the five monitoring rounds conducted since November 2018, including the interim monitoring events (Senversa, 2019a, Senversa, 2019b) and PFAS OMP monitoring events (AECOM, 2020a, AECOM, 2020b). Overall, the 2019 to 2020 monitoring periods have been characterised by warm and dry conditions for a sustained period. MW023 is located down the inferred hydraulic downgradient from Source Area 1, historically this well has not reported a PFAS concentration above laboratory detection limits. Continued non-sampling at MW023 may result in a lack of understanding of PFAS concentrations migrating down gradient of Source Area 1, that may enter sensitive receptors, namely Milners Swamp and low-lying areas (in the northeast) where groundwater may seep into surface water. Consideration of an alternative sample location (such as MW024) should be considered if MW023 continues to be observed dry.	Seek alternative groundwater well (such as MW024) in the CTA to sample as an alternative to MW023 if observed dry to minimise data gap.

Item	Comment	Recommended Actions
Monitoring well network condition	All monitoring wells were accessible. The gatic cover of monitoring well MW066 was damaged and the cap was missing.	AECOM recommends replacing the missing cap and repairing the damaged gatic cover at MW066 during the upcoming sampling rounds to maintain the monitoring well network.
Analytical Results	PFAS concentrations were recorded above the LOR at 7 of the 16 monitoring wells sampled, 5 of the 7 surface water locations sampled.	Nil
First time detection of PFAS in groundwater	No first-time detections of PFAS were recorded at monitoring wells in November 2020.	Nil
First time exceedance of NEMP drinking water guideline values in groundwater	No first time exceedances of NEMP drinking water guideline values were recorded at monitoring wells in November 2020.	Nil
First time exceedance of NEMP drinking water guideline at abstraction bores at SBRS.	No exceedances of screening criteria were detected at abstraction bore MW112 and MW113 located within the SBRS facility.	Nil
First time detection of PFAS in surface water	No first time detections of PFAS in surface water were recorded during December 2020.	Nil
Exceedance of NHMRC recreational guideline for recreational use from sampling locations in Milners Creek	Concentrations of PFAS did not exceed the NHMRC recreational guideline at sampling locations within Milners Creek in December 2020.	Nil

4.2 Upcoming Sampling Events

The next biannual and annual sampling event is scheduled for April 2021.

4.3 Upcoming Annual Interpretive Report

The first annual interpretive report is scheduled to be delivered in June 2021.

5.0 References

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Appendix A

Tables

Table T1
Groundwater Field Results
PFAS OMP
Department of Defence - Robertson Barracks

Location ID	Sampled Date	Depth to Water (mbtoc)	Well Depth (mbtoc)	Water Elevation (mAHD)	TOC (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	4/11/2020	2.46	8.3	-	-	Good	0.3	46.7	30.4	4.7	197.6	397.6	29.1	Clear	Light Brown	Odourless	No Sheen	Hydrasleeve
MW004	4/11/2020	4.78	8.4	26.8	22.00	Good	0.7	130.9	85.1	5.7	62.8	262.8	30.7	Turbid	Brown	Slight Organic	No Sheen	Hydrasleeve
MW004D	4/11/2020	5.70	-	26.8	21.08	Good	1.2	391.5	254.5	6.5	68.3	268.3	31.7	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW012	4/11/2020	5.92	8.7	30.7	24.73	Good	0.8	43.5	28.3	5.2	175.2	375.2	32.0	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW012D	4/11/2020	7.94	-	30.8	22.83	Good	2.1	54.9	35.7	6.1	124.0	324.0	31.5	Clear	Colourless	Hydrogen Sulphide	No Sheen	Hydrasleeve
MW018	4/11/2020	4.00	6.9	25.6	21.57	Good	1.0	39.3	25.5	5.1	182.3	382.3	30.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021	4/11/2020	2.53	7.1	18.0	15.50	Good	2.3	81.1	52.7	7.8	184.4	384.4	30.3	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW021D	4/11/2020	2.74	-	18.0	15.25	Good	0.8	157.9	102.6	6.5	180.2	380.2	30.1	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW023	4/11/2020	**Did not sample as location was Dry**																
MW029	4/11/2020	2.87	4.5	25.4	22.56	Good	0.0	73.4	47.7	5.8	73.7	273.7	31.9	Clear	Light Brown	Colourless	No Sheen	Hydrasleeve
MW030	4/11/2020	2.05	5.5	23.3	21.28	Good	0.4	71.0	46.2	5.7	80.1	280.1	28.9	Turbid	Brown	Slight Organic	No Sheen	Hydrasleeve
MW031	4/11/2020	3.77	7.0	25.6	21.79	Good	0.7	73.1	47.5	5.6	108.6	308.6	31.3	Clear	Light Brown	Odourless	No Sheen	Hydrasleeve
MW032	4/11/2020	5.26	7.0	19.9	14.60	Good	1.3	96.5	62.7	5.4	189.5	389.5	31.5	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW034	4/11/2020	6.80	8.8	19.5	12.70	Good	0.3	50.6	32.9	5.2	175.2	375.2	31.7	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW066	4/11/2020	4.69	9.82	18.5	23.19	Damaged Gatic Cover	2.0	53.4	34.7	4.5	255.8	455.8	32.3	Clear	Colourless	Odourless	No Sheen	Hydrasleeve
MW080	4/11/2020	**Did not sample as location was Dry**																
MW112	4/11/2020	**Did not measure due to tapped well**					4.5	385.6	250.6	6.2	23.2	223.2	28.4	Clear	Colourless	Odourless	No Sheen	Grab Sample
MW113	4/11/2020	**Did not measure due to tapped well**					3.1	342.3	222.5	6.5	-22.6	177.4	30.6	Clear	Colourless	Odourless	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

21/01/2021
Checked By: [redacted]
Checked 21/01/2021

Table T2
Groundwater PFAS Results
PFAS OMP
Department of Defence - Robertson Barracks

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)	Perfluorooctadecanoic Acid (PFODA)	Perfluorooctane sulfonamide (FOSA)	Perfluoropalmitic acid (PFHxDA)	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
	PQL	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02
Ecological Receptors	PFAS NEMP FW 99% Species Protection																															0.00023	19	
Human Health	**PFAS NEMP Human Health Drinking Water**																														**0.07**		**0.56**	
Receptors	**NHMRC (2019) PFAS Recreational Water**																														**2**		**10**	

Location Code	Field ID	Sampled Date	Sampe Type	Lab Report Number																																
MW001	1200_MW001_201105	5/11/2020	Primary	ES2039161	<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	0.23	**0.23**	0.17	<0.01	0.06
	1200_QC102_201105	5/11/2020	Intralab Duplicate	ES2039161	<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	0.21	**0.21**	0.15	<0.01	0.06
	1200_QC202_201105	5/11/2020	Interlab Duplicate	RN1294247	<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	<0.05	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	0.19	**0.19**	0.14	<0.01	0.054
MW004	1200_MW004_201105	5/11/2020	Primary	ES2039161	<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	0.08	**0.08**	0.08	<0.01	<0.02
MW004_D	1200_MW004_D_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW012	1200_MW012_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW012_D	1200_MW012_D_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW018	1200_MW018_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW021	1200_MW021_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW021_D	1200_MW021_D_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW029	1200_MW029_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW030	1200_MW030_201104	4/11/2020	Primary	ES2039161	<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
MW031	1200_MW031_201104	4/11/2020	Primary	ES2039161	<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	<0.02
MW032	1200_MW032_201104	4/11/2020	Primary	ES2039161	<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	0.04	<0.01	<0.02
	1200_QC101_201104	4/11/2020	Intralab Duplicate	ES2039161	<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	0.03	<0.01	<0.02
	1200_QC201_201104	4/11/2020	Interlab Duplicate	RN1294247	<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	0.018	<0.01	<0.05	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	0.13	**0.13**	0.1	<0.01	0.028
MW034	1200_MW034_201104	4/11/2020	Primary	ES2039161	<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	0.09	0.2	<0.02	-	<0.02	-	<0.02	0.12	<0.05	<0.02	<0.02	0.65	**0.21**	0.15	0.03	0.06
MW066	1200_MW066_201104	4/11/2020	Primary	ES2039161	<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	0.03	<0.02	-	<0.02	-	<0.02	<0.02	<0.05	<0.02	<0.02	0.48	**0.43**	0.34	0.02	0.09
	1200_QC100_201104	4/11/2020	Intralab Duplicate	ES2039161	<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	0.03	<0.02	-	<0.02	-	<0.02	<0.02	<0.05	<0.02	<0.02	0.45	**0.4**	0.3	0.02	0.1
	1200_QC200_201104	4/11/2020	Interlab Duplicate	RN1294247	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.05	<0.02	<0.01	<0.05	0.011	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.028	<0.01	<0.05	<0.01	<0.02	0.012	<0.02	<0.02	<0.02	<0.01	0.43	**0.42**	0.35	0.015	0.068
MW112	1200_MW112_201104	4/11/2020	Primary	ES2039161	<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	<0.02
	1200_MW112-FF_20110	4/11/2020	Primary	ES2039161	<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	<0.02
MW113	1200_MW113_201104	4/11/2020	Primary	ES2039161	<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	<0.02
	1200_MW113-FF_20110	4/11/2020	Primary	ES2039161	<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	<0.02

Notes:

Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA

Denotes new exceedence of human health screening criteria

^ LOR Exceeds Adopted Screening Criteria

PQL: Practical
Quantitation Limits

µg/L: micrograms per Litre

(FF) = First Flush Sample

21/01/2021
Checked By: [redacted]
Checked 21/01/2021

Table T3
Historical PFAS Groundwater Analytical Results
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

				Historical PFAS (Full Suite) Analytical Results																															
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorohexanoic acid (PFHxA)	Perfluorobutanoic acid (PFBA)	Perfluorooctanoic acid (PFOA)	Perfluoroheptanoic acid (PFHpA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluoropentanoic acid (PFPeA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PQL				0.002	0.02	0.002	0.02	0.002	0.02	0.002	0.01	0.002	0.002	0.02	0.02	0.02	0.05	0.002	0.02	0.02	0.005	0.005	0.005	0.005	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.002	0.01
Ecological Receptors	**PFAS NEMP (2020) FW 99% Species Protection**							0.00023				19																							
Human Health Receptors	**NHMRC (2019) PFAS Recreational Water**											10																					2	
	PFAS NEMP (2020) Human Health Drinking Water											0.56																					**0.07**	
Location Code	Field ID	Date	Lab Report Number																																
MW001	MW001	30/10/2017	ES1727209	ND	ND	0.07	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.20	0.40
	MW001	8/02/2018	ES1804616	ND	ND	0.04	ND	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15	0.30
	MW001	28/11/2018	ES1835504	ND	ND	0.07	ND	0.15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.22	0.44
	MW001	1/05/2019	ES1913246	ND	ND	0.04	ND	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13	0.26
	1200_MW001_200407	7/04/2020	ES2012108	ND	ND	0.07	ND	0.28	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.35	0.72
	1200_MW001_201105	5/11/2020	ES2039161	ND	ND	0.06	ND	0.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23	0.23
MW004	MW004_0.0	12/10/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW004	30/10/2017	-	ND	ND	0.06	ND	0.07	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13	0.17
	MW004	8/02/2018	-	ND	ND	0.08	ND	0.11	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19	0.24
	MW004	28/11/2018	ES1835504	ND	ND	0.06	ND	0.11	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.17	0.2
	MW004	1/05/2019	-	ND	ND	0.03	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.07
	1200_MW004_201105	5/11/2020	ES2039161	ND	ND	ND	ND	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08
MW004_D	MW004D	2/11/2017	ES1727768	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW004D	10/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW004D	28/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW004D	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004D_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004D_200407	7/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW004_D_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW012	MW012	1/11/2017	ES1727468	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012	9/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012	28/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_181219	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_200407	7/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW012_D	MW012D	2/11/2017	ES1727768	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012D	10/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012D	28/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW012D	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012D_181219	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012D_200407	7/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW012_D_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW018	MW018	1/11/2017	ES1727468	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW018	10/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW018	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW018	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_191219	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_200407	6/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW018_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW021	MW021	2/11/2017	ES1727768	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021	9/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021	28/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW0021_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_200406	6/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW021_D	MW021D	1/11/2017	ES1727468	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021D	10/02/2018	ES1804616	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	MW21D	23/05/2018	ES1814996	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021D	28/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW021D	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021D_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021D_200406	6/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW021_D_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW023	MW023_0.0	19/10/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW023	2/11/2017	-	ND	ND	ND	ND	ND	ND	ND	<0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW023_0.0	31/01/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW023	10/02/2018	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW023	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW029	MW029	10/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW029	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW029	2/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_200406	6/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW029_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table T3
Historical PFAS Groundwater Analytical Results
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

				Historical PFAS (Full Suite) Analytical Results																															
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorohexanoic acid (PFHxA)	Perfluorobutanoic acid (PFBA)	Perfluorooctanoic acid (PFOA)	Perfluoroheptanoic acid (PFHpA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluoropentanoic acid (PFPeA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	PQL			0.002	0.02	0.002	0.02	0.002	0.02	0.002	0.01	0.002	0.002	0.02	0.02	0.02	0.05	0.002	0.02	0.02	0.005	0.005	0.005	0.005	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.002	0.01
Ecological Receptors	**PFAS NEMP (2020) FW 99% Species Protection**							0.00023				19																							
Human Health Receptors	**NHMRC (2019) PFAS Recreational Water**											10																				2	
	PFAS NEMP (2020) Human Health Drinking Water											0.56																				**0.07**	
Location Code	Field ID	Date	Lab Report Number																																
MW030	MW030	12/02/2018	ES1804616	ND	ND	0.03	ND	0.11	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.14	0.16
	MW030	27/11/2018	ES1835504	ND	ND	0.07	ND	0.16	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23	0.25
	MW030	2/05/2019	ES1913246	ND	ND	0.06	ND	0.12	ND	0.03	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18	0.22
	1200_MW030_191218	18/12/2019	ES1942300	ND	ND	0.05	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15	0.15
	1200_MW030_200406	6/04/2020	ES2012108	ND	ND	0.04	ND	0.08	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	0.14
	1200_MW030_201104	4/11/2020	ES2039161	ND	ND	0.05	ND	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.19	0.19
MW031	MW031	10/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW031	27/11/2018	ES1835504	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	MW031	2/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW031_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW031_200406	6/04/2020	ES2012108	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	1200_MW031_201104	4/11/2020	ES2039161	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
MW032	MW032	10/02/2018	ES1804616	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	MW032	27/11/2018	ES1835504	ND	ND	0.04	ND	0.05	ND	0.06	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.21
	MW032	1/05/2019	ES1913246	ND	ND	0.02	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.07
	1200_MW032_191218	18/12/2019	ES1942300	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
	1200_MW032_200407	7/04/2020	ES2012108	ND	ND	0.03	ND	0.05	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.14
	1200_MW032_201104	4/11/2020	ES2039161	ND	ND	<0.02	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.04
MW034	ROBMW01	18/07/2017	ES1717949	ND	ND	ND	ND	0.05	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.09
	ROBMW01	2/11/2017	ES1727768	ND	ND	0.02	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05
	ROBMW01	10/02/2018	ES1804616	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.03
	ROBMW01	23/05/2018	ES1814996	ND	ND	0.03	ND	0.07	ND	0.05	ND	ND	0.02	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10	0.22
	ROBMW01	28/11/2018	ES1835504	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	ROBMW01	1/05/2019	ES1913246	ND	ND	0.02	ND	0.05	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.15
	1200_ROBMW01_191218	18/12/2019	ES1942300	ND	ND	0.03	ND	0.06	ND	0.06	ND	0.01	0.02	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.23
	1200_MW034_200407	7/04/2020	ES2012108	ND	ND	0.02	ND	0.05	ND	0.04	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.15
	1200_MW034_201104	4/11/2020	ES2039161	ND	ND	0.06	ND	0.15	ND	0.2	ND	0.03	0.09	ND	ND	ND	ND	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.21	0.65
MW066	103MW02	18/07/2017	ES1717949	0.02	0.02	0.14	ND	0.48	ND	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.62	0.72
	103MW02_H	20/07/2017	ES1717949	ND	0.02	0.13	ND	0.51	ND	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.64	0.72
	103MW02	1/11/2017	ES1727468	ND	ND	0.17	ND	0.61	ND	0.05	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.78	0.85
	103MW02	12/02/2018	ES1804616	0.08	0.09	0.4	0.03	1.04	ND	0.16	ND	0.08	0.04	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.44	1.96
	103MW02	28/11/2018	ES1835504	ND	ND	0.14	ND	0.41	ND	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.55	0.61
	103MW02	3/05/2019	ES1913032	ND	ND	0.09	ND	0.34	ND	0.02	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.43	0.47
	1200_103MW02_191218	18/12/2019	ES1942300	ND	ND	0.08	ND	0.25	ND	0.02	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.33	0.36
	1200_MW066_200407	7/04/2020	ES2012108	ND	ND	0.11	ND	0.36	ND	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.47	0.53
	1200_MW066_201104	4/11/2020	ES2039161	ND	ND	0.09	ND	0.34	ND	0.03	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.43	0.48
MW080	256MW01	1/06/2016	ES1611898	-	-	-	-	ND	-	-	-	ND	-	-	-	-	-	-	-	-	-	-	ND	ND	-	-	-	-	-	-	-	-	-	-
	ROBMW07	1/06/2016	ES1611898	-	-	-	-	ND	-	-	-	ND	-	-	-	-	-	-	-	-	-	-	ND	ND	-	-	-	-	-	-	-	-	-	-
	ROBMW07	18/07/2017	ES1717949	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ROBMW07	30/10/2017	ES1727209	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	ROBMW007	8/02/2018	ES1804616	ND	ND	ND	ND	0.02	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.04
	ROBMW07	28/11/2018	ES1835504	ND	ND	0.02	ND	0.03	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.10
	ROBMW07	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_ROBMW07_191218	18/12/2019	ES1942300	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	1200_MW080_200407	7/04/2020	ES2012108	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
MW112	SBRS1	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS-1	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS1 (OSP002_Bore01)	17/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW112_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW113	SBRS2	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS-2	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SBRS2 (OSP002_Bore02)	17/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW113_200407	7/04/2020	ES2012108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_MW113_201104	4/11/2020	ES2039161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes
PQL: Practical Quantitation Limits
µg/L: micrograms per Litre
ND: No Detect above PQL

Table T4
Groundwater Non-PFAS Analytical Results
PFAS OMP
Department of Defence - Robertson Barracks

AECOM

		DOC	Inorganics												Metals		
		Dissolved Organic Carbon	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Fluoride	Ionic Balance	Sodium (Filtered)	Sulfate as SO4 - Turbidimetric (Filtered)	Total Suspended Solids	Calcium (Filtered)	Magnesium (Filtered)	Potassium (Filtered)
		mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	meq/L	mg/L	meq/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L
	PQL	1	1	5	1	1000	1	0.01	1	0.01	1	0.1	0.01	1	1	1	1
MW004	1200_MW004_201105	8	20	<1	<1000	20	0.6	0.35	7	<0.1	-	8	<1	1240	<1	<1	<1
MW004_D	1200_MW004_D_201104	3	167	<1	<1000	167	3.53	3.24	4	0.5	4.39	39	4	54	9	12	4
MW012	1200_MW012_201104	<1	4	<1	<1000	4	0.14	0.09	2	<0.1	-	2	<1	42	<1	<1	<1
MW012_D	1200_MW012_D_201104	3	16	<1	<1000	16	0.38	0.29	2	<0.1	-	6	<1	8	<1	<1	1
MW021	1200_MW021_201104	1	8	<1	<1000	8	0.3	0.13	5	<0.1	-	3	<1	208	<1	<1	<1
MW021_D	1200_MW021_D_201104	<1	66	<1	<1000	66	1.42	1.31	2	0.1	-	9	2	64	7	6	3
MW112	1200_MW112_201104	<1	176	<1	<1000	176	3.67	3.47	4	0.2	2.85	11	2	<5	43	9	4
MW113	1200_MW113_201104	<1	146	<1	<1000	146	3.07	2.8	4	0.3	4.64	10	2	<5	31	9	3

Location Code	Field ID	Sampled Date Time	Lab Report Number	Sample Type
MW004	1200_MW004_201105	5/11/2020	ES2039161	Primary
MW004_D	1200_MW004_D_201104	4/11/2020	ES2039161	Primary
MW012	1200_MW012_201104	4/11/2020	ES2039161	Primary
MW012_D	1200_MW012_D_201104	4/11/2020	ES2039161	Primary
MW021	1200_MW021_201104	4/11/2020	ES2039161	Primary
MW021_D	1200_MW021_D_201104	4/11/2020	ES2039161	Primary
MW112	1200_MW112_201104	4/11/2020	ES2039161	Primary
MW113	1200_MW113_201104	4/11/2020	ES2039161	Primary

Notes:
PQL: Practical
mg/L: milligram per Litre
µg/L: micrograms per Litre
meq/L: milliequivalents per Litre

21/01/2021
Checked By: [redacted]
Checked 21/01/2021

Table T5
Surface Water Field Results
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

Field Measurements													
Location ID	**Sampled Date**	**DO (mg/L)**	**EC (µS/cm)**	**TDS (calc)**	**pH**	**Redox (mV)**	**Redox (corr) (mV)**	**Temp (^{o}C)**	**Turbidity**	**Water Colour**	**Odour**	**Sheen**	**Sample Method**
SW001	21/12/2020	3.49	83.6	54.3	7.4	181.3	381.3	30.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW007	21/12/2020	6.0	42.2	27.4	7.9	141.3	341.3	31.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW023	**Sampling Location Dry and unable to sample**												
SW028	**Sampling Location Dry and unable to sample**												
SW059	21/12/2020	4.2	25.5	16.6	7.7	165.3	365.3	33.2	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW075	15/12/2020	0.89	40.4	26.3	6.3	161.9	361.9	29.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW086	15/12/2020	0.89	36.1	23.5	5.8	155	355	29.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW091	15/12/2020	1.57	119.9	77.9	8.4	84	284	30.6	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW123	15/12/2020	0.56	37.1	24.1	7.9	139.6	339.6	34.7	Clear	Colourless	Odourless	No Sheen	Grab Sample

Notes:
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
^{o}C: degrees celcius

21/01/2021
Checked By: [redacted]
Checked 21/01/2021

Table T6
PFAS Surface Water Analytical Results
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

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)	Perfluorooctadecanoic Acid (PFODA)	Perfluorooctane sulfonamide (FOSA)	Perfluoropalmitic acid (PFHxDA)	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
	PQL	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	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.05	0.02		0.02	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**	**Sampled Date**	**Lab Report Number**	**Sample Type**																														
SW001	1200_SW001_201221	21/12/2020	ES2045525	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	0.03	0.03	0.03^	<0.01	<0.02
SW007	1200_SW007_201221	21/12/2020	ES2045525	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	<0.02
SW059	1200_SW059_201221	21/12/2020	ES2045525	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	<0.02
	1200_QC100_201221	21/12/2020	ES2045525	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	<0.02
	1200_QC200_201221	21/12/2020	AECO006/210106	Interlab 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	<0.05	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
SW075	1200_SW075_201215	15/12/2020	ES2045382	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	<0.02
SW086	1200_SW086_201215	15/12/2020	ES2045382	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	<0.02
SW091	1200_SW091_201215	15/12/2020	ES2045382	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	0.04^	<0.01	<0.02
SW123	1200_SW123_201215	15/12/2020	ES2045382	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	0.02	0.02	0.02^	<0.01	<0.02

Notes:

Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA

Denotes new exceedence of human health screening criteria

^ LOR Exceeds Adopted Screening Criteria

PQL: Practical Quantitation Limits

µg/L: micrograms per Litre

21/01/2021
Checked By: [redacted]
Checked 21/01/2021

Table T7
Historical PFAS Surface Water Analytical Results
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

				Historical PFAS (Full Suite) Analytical Records																													
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorohexanoic acid (PFHxA)	Perfluorobutanoic acid (PFBA)	Perfluorooctanoic acid (PFOA)	Perfluoroheptanoic acid (PFHpA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluoropentanoic acid (PFPeA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
		PQL		0.002	0.02	0.002	0.02	0.002	0.02	0.002	0.01	0.002	0.002	0.02	0.02	0.02	0.05	0.002	0.02	0.02	0.005	0.005	0.005	0.005	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.002	0.01
Ecological Receptors	**PFAS NEMP FW 99% Species Protection**							0.00023				19																					
Human Health Receptors	**NHMRC (2019) PFAS Recreational Water**											10																				2	
	PFAS NEMP Human Health Drinking Water											0.56																				**0.07**	
Location Code	Field ID	Sample Date	Lab Report Number																														
SW001	SW01	19/07/2017	ES1717949	ND	ND	0.03	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.09
	SW001	4/10/2017	ES1725240	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.05
	SW001	2/02/2018	ES1803862	ND	ND	0.04	ND	0.05	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09	0.11
	1200_SW001_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW001_200406	6/04/2020	ES2012098	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.06
	1200_SW001_201221	21/12/2020	ES2045525	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.03
SW007	SW07	19/07/2017	ES1717949	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.04
	SW007	2/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW007	1/05/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01
	1200_SW007_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW007_201221	21/12/2020	ES2045525	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW023	SW023	3/02/2018	ES1803868	ND	ND	ND	ND	0.01	ND	0.04	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.08
	1200_SW023_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				Sampling Location Dry and unable to be sampled																														
SW028	SW028	2/02/2018	ES1803862	ND	ND	0.1	ND	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18	0.18
	1200_SW028_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				Sampling Location Dry and unable to be sampled																														
SW059	SW059	1/02/2018	ES1803862	0.05	0.06	0.29	ND	0.38	ND	0.11	ND	0.03	0.02	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.67	0.97
	SW059	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW059	1/05/2019	ES1913246	ND	ND	ND	ND	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	0.12
	1200_SW059_200122	22/01/2020	ES2002244	ND	ND	0.02	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08
	1200_SW059_201221	21/12/2020	ES2045525	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
SW075	SW075	17/10/2017	ES1725949	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.06
	SW075	2/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW075	23/05/2018	ES1814996	ND	ND	0.04	ND	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13	0.13
	SW075	27/11/2018	ES1835504	ND	ND	0.04	ND	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.11	0.11
	SW075	30/04/2019	ES1913246	ND	ND	0.03	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08
	1200_SW075_191218	18/12/2019	ES1942300	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
	1200_SW075_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW075_200406	6/04/2020	ES2012098	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	1200_SW075_201215	15/12/2020	ES2045382	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
SW086	SW086	1/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW086	27/11/2018	ES1835504	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW086	30/04/2019	ES1913246	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_191218	18/12/2019	ES1942300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_200122	22/01/2020	ES2002244	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_200406	6/04/2020	ES2012098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1200_SW086_201215	15/12/2020	ES2045382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SW091	SW091	19/10/2017	ES1726436	ND	ND	0.03	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08
	SW091	1/02/2018	ES1803862	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW091	27/11/2018	ES1835504	ND	ND	0.03	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.08	0.08
	SW091	30/04/2019	ES1913246	ND	ND	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.03
	1200_SW091_191219	18/12/2019	ES1942300	ND	ND	0.03	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.07
	1200_SW091_200122	22/01/2020	ES2002244	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
	1200_SW091_200406	6/04/2020	ES2012098	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	1200_SW091_201215	15/12/2020	ES2045382	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.04
SW123	SW123	1/02/2018	ES1803862	ND	ND	0.07	ND	0.14	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.21	0.23
	SW123	23/05/2018	ES1814996	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW123	27/11/2018	ES1835504	ND	ND	0.11	ND	0.23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.34	0.4
	1200_SW123_191218	18/12/2019	ES1942300	ND	ND	0.03	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.06
	1200_SW123_200406	6/04/2020	ES2012098	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02
	1200_SW123_201215	15/12/2020	ES2045382	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.02

Notes
PQL: Practical Quantitation Limits
µg/L: micrograms per Litre
ND: No Detect above PQL

Table T8
Non-PFAS Surface Water Analytical Results
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

AECOM

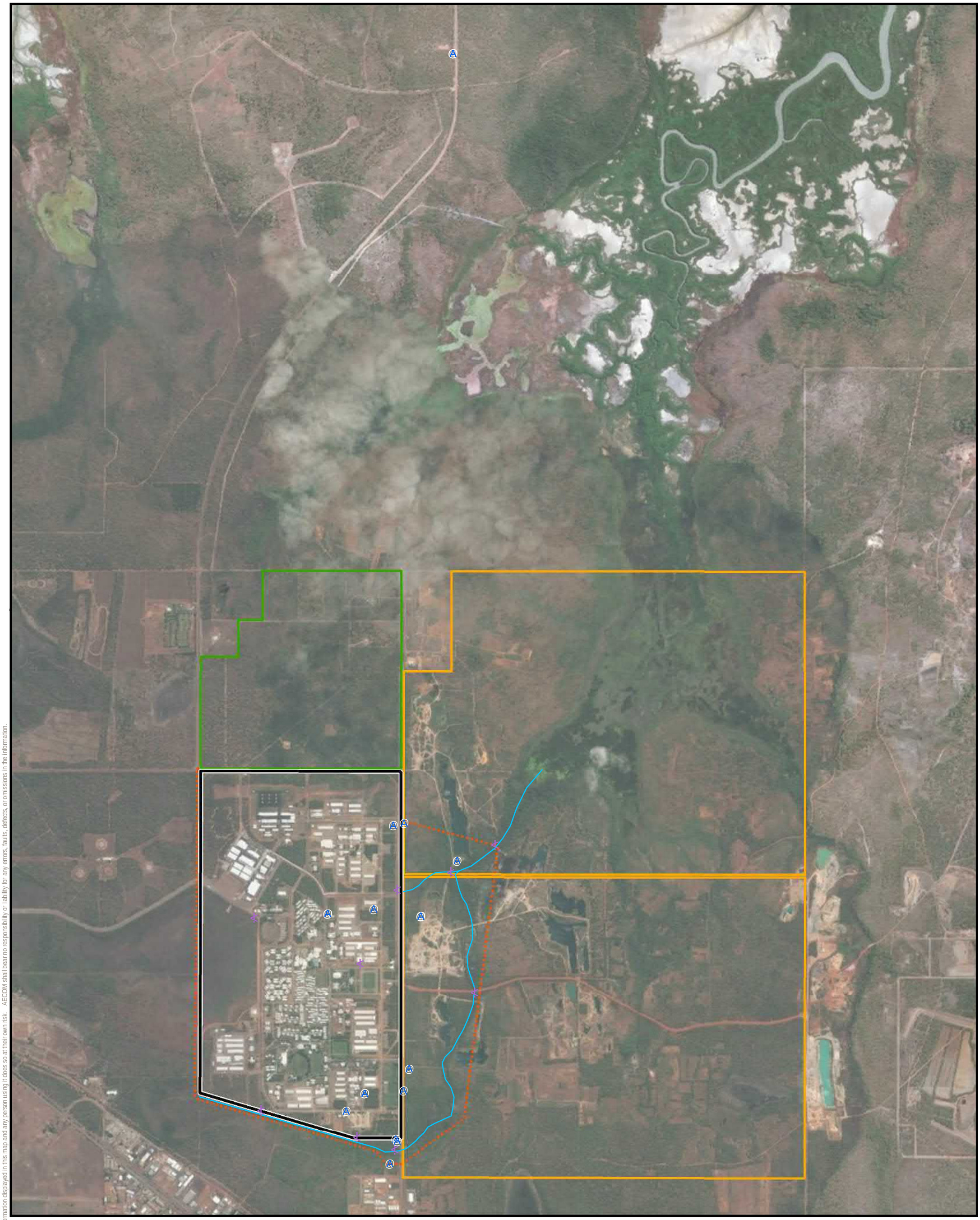
					DOC	Inorganics			Major Ions													
					Dissolved Organic Carbon	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Fluoride	pH (Lab)	Sodium (Filtered)	Sulfate as SO4 - Turbidimetric (Filtered)	TDS	TSS	Calcium (Filtered)	Magnesium (Filtered)	Potassium (Filtered)
					mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				PQL	1	0.01	10	5	1	0.1	1	1	1000	1	1	1	1	1	1	0.01	0.01
Location_Code	**Field_ID**	**Sampled_Date_Time**	**Lab_Report_Number**	**Sample Type**																		
SW007	1200_SW007_201221	21/12/2020	ES2045525	Primary	1	10	<1	<1	10	0.31	0.23	4	<0.1	6.18	3	<1	20	15	2	<1	<1
SW059	1200_SW059_201221	21/12/2020	ES2045525	Primary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1200_QC100_201221	21/12/2020	ES2045525	Intralab Duplicate	4	7	<1	<1	7	0.28	0.23	5	<0.1	5.85	3	<1	23	146	2	<1	<1
	1200_QC200_201221	21/12/2020	AECO006/210106	Interlab Duplicate	4.6	<5	<5	<5	-	<5	<5	4	<0.1	6.1	2.6	3.4	19	180	1.8	0.6	0.3
SW075	1200_SW075_201215	15/12/2020	ES2045382	Primary	1	8	<1	<1	8	0.3	0.18	5	<0.1	5.91	3	<1	24	<5	1	<1	<1
SW086	1200_SW086_201215	15/12/2020	ES2045382	Primary	<1	6	<1	<1	6	0.2	0.09	3	<0.1	5.83	2	<1	14	<5	<1	<1	<1
SW091	1200_SW091_201215	15/12/2020	ES2045382	Primary	<1	12	<1	<1	12	0.35	0.22	4	<0.1	6.58	4	<1	24	<5	1	<1	<1
SW123	1200_SW123_201215	15/12/2020	ES2045382	Primary	<1	10	<1	<1	10	0.28	0.46	3	<0.1	6.02	4	<1	34	<5	<1	<1	11.0

Notes:
PQL: Practical Quantitation Limits
mg/L: milligram per Litre
µg/L: micrograms per Litre
meq/L: milliequivalents/Litre

21/01/2021
Checked By: [redacted]
Checked 21/01/2021

Appendix B

Figures



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 250 500 1,000

metres

1:27,419 (when printed at A3)

LEGEND

- Groundwater sample location
- Surface Water and Sediment sample locations
- Watercourse
- Highway
- Road
- Track
- Monitoring Area

Site Layout

- Robertson Baracks
- Close Training
- Marksmanship Training Range

Data sources:

Department of Defence
ROBERTSON BARRACKS
ONGOING MONITORING PROGRAM

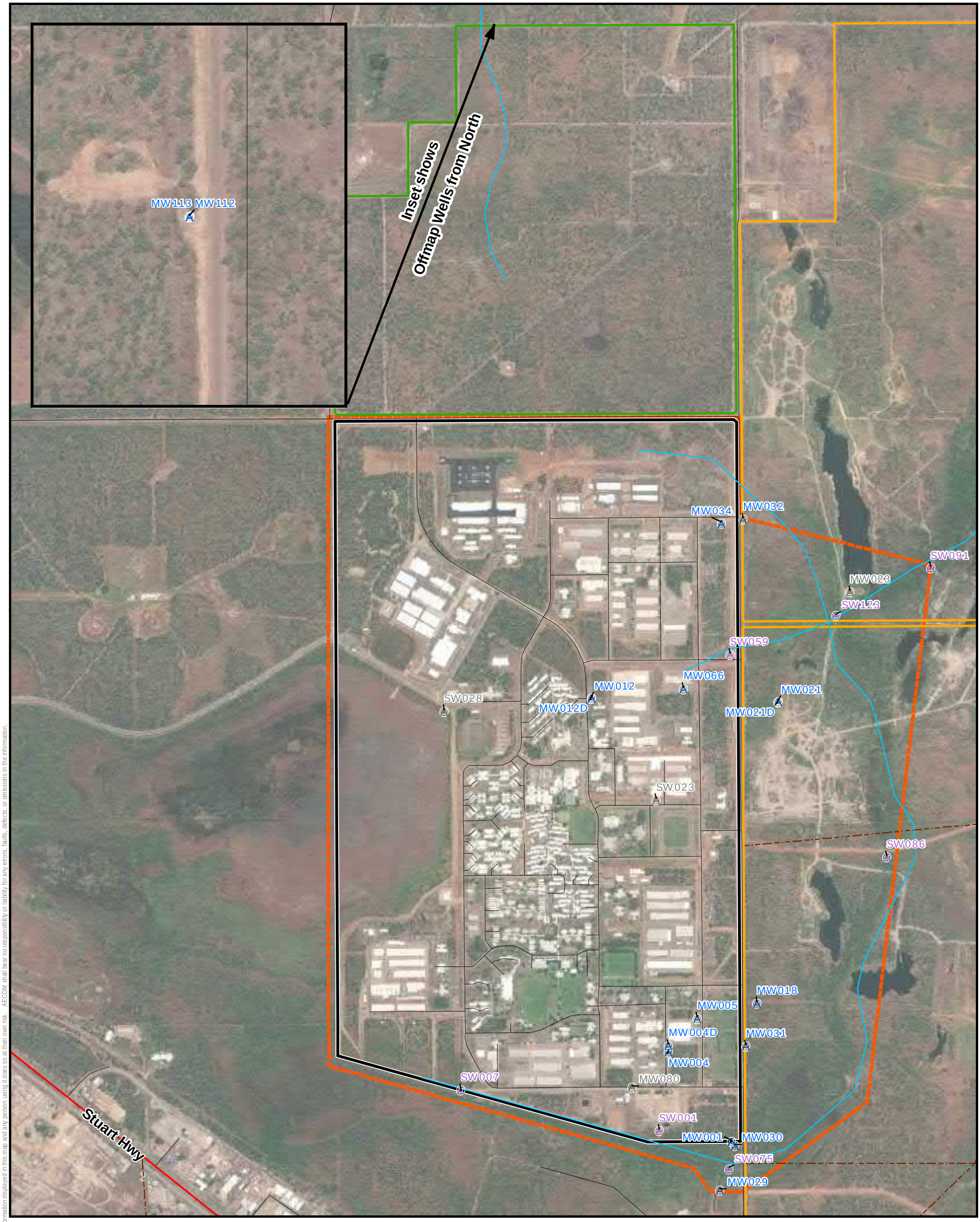
SITE LOCATION

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

Figure 1

Filename: \\autsv1fp001\GIS\TSV_GIS\Projects\60612561_Darwin_Def\02_MXDs\RoboBarracks\DRAFT B\60612561_F01_RobertsonBarracks_OverallLocationsA3L.mxd

A3 size



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:14,000 (when printed at A3)

LEGEND

- A Groundwater Monitoring Locations
- A Surface Water Locations
- A Dry/Damaged/Blocked Locations
- Watercourse
- Highway
- Road
- Track
- Monitoring Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

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

Department of Defence
ROBERTSON BARRACKS
ONGOING MONITORING PROGRAM

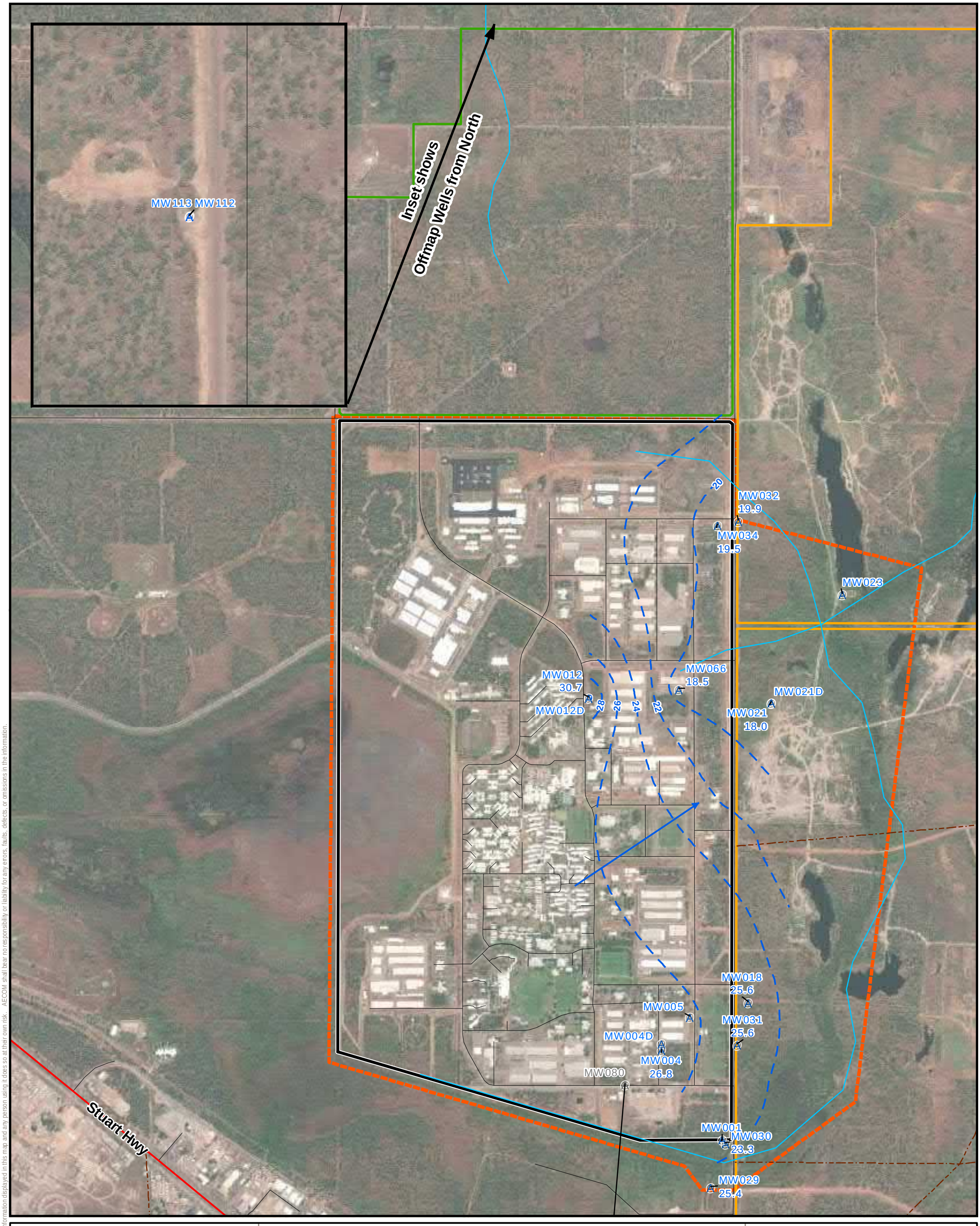
GROUNDWATER AND SURFACE WATER SAMPLE LOCATIONS

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

Figure
2

Filename: \\audwn1fp001\Projects\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\2020\Version 10.6\Q4_2020\60612561_F02_RobertsonBarracks_SampledLocation_A3P.mxd

A3 size



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:14,000 (when printed at A3)

LEGEND

- A Groundwater Monitoring Locations
- A Dry/Damaged/Blocked Locations
- 175.44 Inferred Groundwater Level (mAHD)
- Inferred Groundwater Level
- Inferred Flow Direction
- Watercourse
- Highway
- Road
- Track
- Monitoring Area

Site Layout

- Robertson Barracks
- Close Training Area
- Marksmanship Training Range

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

Department of Defence
ROBERTSON BARRACKS
ONGOING MONITORING PROGRAM

INFERRED GROUNDWATER ELEVATION

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

Figure 3

Filename: \\audwn1fp001\Projects\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\2020\Version 10.6\Q4_2020\60612561_F03_RobertsonBarracks_GWContour_A3P.mxd

A3 size

Appendix C

Calibration Certificates

ROB

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

+61 8 8942 6200 tel
+61 8 8942 6299 fax
ABN 20 093 846 925

Equipment Information

Instrument: YSI PRO

Serial Number:

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)	☐	N/A
Probe Guard	☐	N/A
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	±0.5%	☑	☐
	☐ Check linearity at 1.413mS/cm	±0.5%	☑	☐
Salinity	Auto Calibrated	±1%	☑	☐
pH	☑ pH 7.00 & pH 10	± 0.2	☑	☐
	☑ pH 4	± 0.2	☑	☐
ORP	☑ 233mV at 22 °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: 3/11/20

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Darwin NT 0800
GPO Box 3175
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+61 8 8942 6200 tel
+61 8 8942 6299 fax
ABN 20 093 846 925

Equipment Information

Instrument: YSI PRO

Serial Number: 19G 102635

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	⊟	NA
User Manual + Flow Cell Manual	⊟	NA
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	±0.5%	☑	☐	
	☑ Check linearity at 1.413mS/cm	±0.5%	☑	☐	
Salinity	Auto Calibrated	±1%	☑	☐	
pH	☑ pH 7.00	± 0.2	☑	☐	
	☑ pH 10 , 4 , 7	± 0.2	☑	☐	ph: 4.1
ORP	☐ 236 mV at 25 °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: 14/12/2020.

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Darwin NT 0800
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ABN 20 093 846 925

Equipment Information

Instrument: YSI PRO

Serial Number: 19G102675

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	☐	N/A
User Manual + Flow Cell Manual	☐	N/A
Spare Batteries (x2) & Screwdriver	☑	~~N/A~~
Laminated Quick Start Guide	☐	N/A

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	±0.5%	☑	☐	
	☑ Check linearity at 1.413mS/cm	±0.5%	☑	☐	
Salinity	Auto Calibrated	±1%	☑	☐	
pH	☑ pH 7.00	± 0.2	☑	☐	
	☑ pH 10 ✓pH 4	± 0.2	☑	☐	pH 4.30
ORP	☑ 234 mV at 24.4 °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: 21/12/2020

Appendix D

Analytical Data Validation

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DATA VALIDATION REPORT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	11/05/2020
Site:	Robertson Barracks		
Matrix:	Groundwater	**Data Verified by:**	[redacted]
Laboratory:	ALS (Sydney), NMI (Sydney)	**Date:**	14/01/2021
Lab reference:	ES2039161, RN1294247		

Key Findings:
The groundwater 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
- The elevated RPD for sum of PFHxS + PFOS analytes, should be taken into consideration when reporting results that are marginally above (MW004, QC201 and MW030) and below (MW032) the adopted guideline value.

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			No
Number of tests requested/reported		✓			No
Sample handling/preservation/holding times			✓	1	No
Limits of reporting (LOR)		✓		2	No
Frequency of laboratory QA/QC			✓	3	No
Blank analysis	Field blank	✓			No
	Rinsate blank	✓			No
	Trip blank	✓			No
	Method blank	✓			No
Field intra-laboratory relative percent differences (RPDs)		✓			No
Field inter-laboratory RPDs			✓	4	No
Laboratory duplicate RPDs		✓			No
Matrix spike (MS) % recoveries		✓			No
Laboratory control spike (LCS) % recoveries		✓			No
Surrogate % recoveries		✓			No
Other observations		✓		5	N/A

1 of 2

Comments

1. Sample handling

Primary, duplicate and triplicate groundwater samples were received preserved and chilled at the laboratory. The sample receipt temperatures for lab batches are as below:

Batch Number	Temperature (°C)
ES2039161	6.6°C
RN1294247	Chilled

The sample receipt temperatures for primary batch ES2039161 is outside the recommended temperature range (<6°C). As the samples were recorded marginally outside the recommended temperature range there is a small chance of under reporting. However, as the temperature is recorded well below the ambient surface water temperature at the time of sampling (>25°C), samples were immediately cooled upon collection and primary and inter-laboratory duplicate RPDs were generally within control limits (except for sum of PFAS and sum of PFHxS + PFOS) the likelihood of under reporting is unlikely and immaterial to the interpretation of results.

2. Limits of reporting

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.

3. Frequency of laboratory QA/QC

The frequency of laboratory QA/QC were adequate across all analytical methods, with the exception of the following in laboratory batches ES2039161:

- Laboratory duplicates were not reported for PFAS analytes. 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 generally within control limits.
- Matrix spikes were not reported for PFAS analytes. The accuracy of the data can be assessed as acceptable based on method blanks and laboratory control spike result which were reported at the required frequencies and within control limits for these analytes.

4. Field inter-laboratory RPDs

Field inter-laboratory RPDs were reported within control limits, except for the following (the sample with the higher reported concentrations are in bold):

- MW032 and **QC201** for sum of PFAS (114%)
- MW032 and **QC201** for sum of PFHxS and PFOS (105%)

The elevated RPD should be taken into consideration when interpreting concentrations for sum of PFAS quantitatively. The elevated RPD for sum of PFHxS + PFOS analytes, should be taken into consideration when reporting results that are marginally above (MW004, QC201 and MW030) and below (MW032) the adopted guideline value.

5. Other comments

ALS confirmed positive 'PFOS' results for samples MW032 and QC101 by re-extraction and re-analysis.

2 of 2

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DATA VALIDATION REPORT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	12/01/2021
Site:	Robertson Barracks		
Matrix:	Surface Water	**Data Verified by:**	[redacted]
Laboratory:	ALS (Sydney)	**Date:**	14/01/2021
Lab reference:	ES2045382, ES2045525, AECO006/210106		

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

- Holding time exceedances should be taken into consideration when interpreting results for pH and dissolved major cations quantitatively.
- 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
- The elevated laboratory duplicate RPD for bicarbonate alkalinity as $CaCO_3$ and total alkalinity as $CaCO_3$ quantitatively.

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			No
Number of tests requested/reported		✓			No
Sample handling/preservation/holding times			✓	1,2	No
Limits of reporting (LOR)			✓	3	No
Frequency of laboratory QA/QC			✓	4	No
Blank analysis	Field blank	✓			No
	Rinsate blank	✓			No
	Trip blank	✓			No
	Method blank	✓			No
Field intra-laboratory relative percent differences (RPDs)		✓			No
Field inter-laboratory RPDs		✓			No
Laboratory duplicate RPDs			✓	5	No
Matrix spike (MS) % recoveries		✓			No
Laboratory control spike (LCS) % recoveries		✓			No
Surrogate % recoveries		✓			No
Other observations			✓	6	N/A

1 of 3

Comments

1. Sample handling

Primary, duplicate and triplicate surface water samples were received preserved and chilled at the laboratory. The sample receipt temperatures for lab batches are as below:

Batch Number	Temperature
ES2045525	13.1˚C
ES2045382	15.8˚C
AECO06_210106	Chilled

The sample receipt temperatures for ES2045525 and ES2045382 were outside the recommended range (<6ºC). As the samples in these laboratory batches were received outside of the specified temperature range but well below the ambient surface water temperature at the time of sampling (>25°C), the samples were immediately cooled upon collection and RPDs between the primary and inter-laboratory duplicate sample were within control limits, this minor temperature exceedance is not anticipated to have resulted in volatile losses.

2. Sample Holding Times

Samples were analysed up to 15 and 8 days outside of recommended holding times for pH (6hr holding time) and dissolved major cations (calcium, magnesium, sodium and potassium) (7 day holding time), respectively, in samples SW091, SW086, SW123 and SW075 of ES2045382 and, SW007 and QC100 of ES2045525.

There is the potential for pH and dissolved major cations to have degraded over time and not be representative of field conditions. In particular, it is noted laboratory pH results were generally lower than field pH measurements indicating the potential under reporting of this parameter.

As these analytes are not considered a contaminant of potential concern (COPC) for these samples, the potential for under or over reporting is not considered to materially affect the interpretation of results, however, should be taken into consideration when using the data for interpretive purposes.

3. Limits of reporting

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. Frequency of laboratory QA/QC

The frequency of laboratory QA/QC were adequate across all analytical methods, with the exception of the following in laboratory batch ES2045382:

- Laboratory duplicates were not reported for PFAS analytes. 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.
- Matrix spikes were not reported for PFAS analytes. The accuracy of the data can be assessed as acceptable based on method blanks and laboratory control spike results, which were reported at the required frequencies and within control limits for these analytes.

2 of 3

5. Laboratory duplicate RPDs	Laboratory duplicate RPDs were reported within control limits, with the exception of laboratory duplicate RPDs for surface water samples in laboratory batch ES2045525 for bicarbonate alkalinity as $CaCO_3$ and total alkalinity as $CaCO_3$, which were both reported marginally above of the 0-20% control limit (26.4%). As there are no adopted guideline values for surface water for bicarbonate alkalinity and total alkalinity, the elevated laboratory duplicate RPDs are not expected to affect the interpretation of results against guideline values. However, the elevated RPDs should be taken into consideration when using the data quantitatively. ALS Laboratory commented on the certificate of analysis (COA) that poor duplicate precision for alkalinity was due to insufficient sample provided for analysis.
6. Other comments	• TDS by method EA-015 may bias high for QC100 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper. • ED037: Poor duplicate precision for Alkalinity. However, insufficient sample has been provided for confirmation analysis.

3 of 3

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DATA VALIDATION REPORT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	11/05/2020
Site:	Robertson Barracks		
Matrix:	Groundwater	**Data Verified by:**	[redacted]
Laboratory:	ALS (Sydney), NMI (Sydney)	**Date:**	14/01/2021
Lab reference:	ES2039161, RN1294247		

Key Findings:
The groundwater 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
- The elevated RPD for sum of PFHxS + PFOS analytes, should be taken into consideration when reporting results that are marginally above (MW004, QC201 and MW030) and below (MW032) the adopted guideline value.

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			No
Number of tests requested/reported		✓			No
Sample handling/preservation/holding times			✓	1	No
Limits of reporting (LOR)		✓		2	No
Frequency of laboratory QA/QC			✓	3	No
Blank analysis	Field blank	✓			No
	Rinsate blank	✓			No
	Trip blank	✓			No
	Method blank	✓			No
Field intra-laboratory relative percent differences (RPDs)		✓			No
Field inter-laboratory RPDs			✓	4	No
Laboratory duplicate RPDs		✓			No
Matrix spike (MS) % recoveries		✓			No
Laboratory control spike (LCS) % recoveries		✓			No
Surrogate % recoveries		✓			No
Other observations		✓		5	N/A

1 of 2

Comments

1. Sample handling

Primary, duplicate and triplicate groundwater samples were received preserved and chilled at the laboratory. The sample receipt temperatures for lab batches are as below:

Batch Number	Temperature (°C)
ES2039161	6.6°C
RN1294247	Chilled

The sample receipt temperatures for primary batch ES2039161 is outside the recommended temperature range (<6°C). As the samples were recorded marginally outside the recommended temperature range there is a small chance of under reporting. However, as the temperature is recorded well below the ambient surface water temperature at the time of sampling (>25°C), samples were immediately cooled upon collection and primary and inter-laboratory duplicate RPDs were generally within control limits (except for sum of PFAS and sum of PFHxS + PFOS) the likelihood of under reporting is unlikely and immaterial to the interpretation of results.

2. Limits of reporting

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.

3. Frequency of laboratory QA/QC

The frequency of laboratory QA/QC were adequate across all analytical methods, with the exception of the following in laboratory batches ES2039161:

- Laboratory duplicates were not reported for PFAS analytes. 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 generally within control limits.
- Matrix spikes were not reported for PFAS analytes. The accuracy of the data can be assessed as acceptable based on method blanks and laboratory control spike result which were reported at the required frequencies and within control limits for these analytes.

4. Field inter-laboratory RPDs

Field inter-laboratory RPDs were reported within control limits, except for the following (the sample with the higher reported concentrations are in bold):

- MW032 and **QC201** for sum of PFAS (114%)
- MW032 and **QC201** for sum of PFHxS and PFOS (105%)

The elevated RPD should be taken into consideration when interpreting concentrations for sum of PFAS quantitatively. The elevated RPD for sum of PFHxS + PFOS analytes, should be taken into consideration when reporting results that are marginally above (MW004, QC201 and MW030) and below (MW032) the adopted guideline value.

5. Other comments

ALS confirmed positive 'PFOS' results for samples MW032 and QC101 by re-extraction and re-analysis.

2 of 2

Groundwater Blank Sample Analytical Results
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		4/11/2020	5/11/2020	4/11/2020	5/11/2020	4/11/2020	5/11/2020
	Matrix Type		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
	Lab Report Number		ES2039161	ES2039161	ES2039161	ES2039161	ES2039161	ES2039161
	Sample Type		Rinsate	Rinsate	Field Blank	Field Blank	Trip Blank	Trip Blank
	Field ID		1200_QC300_201104	1200_QC301_201105	1200_QC400_201104	1200_QC401_201105	1200_QC500_201104	1200_QC501_201105
ChemName	Unit	PQL						
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
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	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
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	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
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	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
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	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
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	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
Perfluorobutanoic acid (PFBA)	µg/L	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
Perfluorodecanoic acid (PFDA)	µg/L	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
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	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
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<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	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	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
Perfluoropentanoic acid (PFPeA)	µg/L	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
Perfluorotridecanoic acid (PFTrDA)	µg/L	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
Sum of PFAS	µg/L	0.01	<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	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	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	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Groundwater Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		4/11/2020	4/11/2020	RPD	4/11/2020	4/11/2020	RPD
	Sample ID		MW066	QC100		MW032	QC101	
	Lab Report Number		ES2039161	ES2039161		ES2039161	ES2039161	
	Sample Type		Primary	Intralab Duplicate		Primary	Intralab Duplicate	
	Field ID		1200_MW066_201104	1200_QC100_201104		1200_MW032_201104	1200_QC101_201104	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.1	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	0.03	0.03	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	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	<0.05	<0.05	0	<0.05	<0.05	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	<0.02	<0.02	0	<0.02	<0.02	0
Sum of PFAS	µg/L	0.01	0.48	0.45	6	0.04	0.03	29
Sum of PFHxS and PFOS	µg/L	0.01	0.43	0.4	7	0.04	0.03	29
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.34	0.3	13	0.04	0.03	29
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	0.02	0.02	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	0.09	0.1	11	<0.02	<0.02	0

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

Groundwater Relative Percentage Differences
PFAS OMP 3 Year Monitoring
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	Date		5/11/2020	5/11/2020	RPD	4/11/2020	4/11/2020	RPD
	Sample ID		MW001	QC102		MW066	QC200	
	Lab Report Number		ES2039161	ES2039161		ES2039161	RN1294247	
	Sample Type		Primary	Intralab Duplicate		Primary	Intralab Duplicate	
	Field ID		1200_MW001_201105	1200_QC102_201105		1200_MW066_201104	1200_QC200_201104	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<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	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA	µg/L	0.02	<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	<0.02	<0.02	0	<0.02	0.011	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	0.03	0.028	7
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	0.012	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	<0.05	<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	<0.02	<0.02	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	0.23	0.21	9	0.48	0.583	19
Sum of PFHxS and PFOS	µg/L	0.01	0.23	0.21	9	0.43	0.418	3
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.17	0.15	13	0.34	0.35	3
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	0.02	0.015	29
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	0.06	0.06	0	0.09	0.068	28

Notes:
**High RPDs are in bold (Acceptable RPDs for each PQL multiplier range are: 200 (1-10 x
***Interlab Duplicates are matched on a per compound basis as methods vary between

Groundwater Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		4/11/2020	4/11/2020	RPD	5/11/2020	5/11/2020	RPD
	Sample ID		MW032	QC201		MW001	QC202	
	Lab Report Number		ES2039161	RN1294247		ES2039161	RN1294247	
	Sample Type		Primary	Interlab Duplicate		Primary	Interlab Duplicate	
	Field ID		1200_MW032_201104	1200_QC201_201104		1200_MW001_201105	1200_QC202_201105	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.02	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.01	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	<0.05	<0.02	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA	µg/L	0.02	<0.02	<0.01	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	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.05	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	0.018	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.01	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	<0.05	<0.02	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	<0.02	<0.01	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	0.04	0.146	114	0.23	0.194	17
Sum of PFHxS and PFOS	µg/L	0.01	0.04	0.128	105	0.23	0.194	17
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.04	0.1	86	0.17	0.14	19
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	0.028	33	0.06	0.054	11

Notes:
**High RPDs are in bold (Acceptable RPDs for each PQL multiplier range are: 200 (1-10 x
***Interlab Duplicates are matched on a per compound basis as methods vary between

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DATA VALIDATION REPORT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:**	12/01/2021
Site:	Robertson Barracks		
Matrix:	Surface Water	**Data Verified by:**	[redacted]
Laboratory:	ALS (Sydney)	**Date:**	14/01/2021
Lab reference:	ES2045382, ES2045525, AECO006/210106		

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

- Holding time exceedances should be taken into consideration when interpreting results for pH and dissolved major cations quantitatively.
- 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
- The elevated laboratory duplicate RPD for bicarbonate alkalinity as $CaCO_3$ and total alkalinity as $CaCO_3$ quantitatively.

Component		Outliers			Material impact on interpretation
		No	Yes	Comment	
Frequency of field quality assurance/quality control (QAQC)		✓			No
Number of tests requested/reported		✓			No
Sample handling/preservation/holding times			✓	1,2	No
Limits of reporting (LOR)			✓	3	No
Frequency of laboratory QA/QC			✓	4	No
Blank analysis	Field blank	✓			No
	Rinsate blank	✓			No
	Trip blank	✓			No
	Method blank	✓			No
Field intra-laboratory relative percent differences (RPDs)		✓			No
Field inter-laboratory RPDs		✓			No
Laboratory duplicate RPDs			✓	5	No
Matrix spike (MS) % recoveries		✓			No
Laboratory control spike (LCS) % recoveries		✓			No
Surrogate % recoveries		✓			No
Other observations			✓	6	N/A

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Comments

1. Sample handling

Primary, duplicate and triplicate surface water samples were received preserved and chilled at the laboratory. The sample receipt temperatures for lab batches are as below:

Batch Number	Temperature
ES2045525	13.1˚C
ES2045382	15.8˚C
AECO06_210106	Chilled

The sample receipt temperatures for ES2045525 and ES2045382 were outside the recommended range (<6ºC). As the samples in these laboratory batches were received outside of the specified temperature range but well below the ambient surface water temperature at the time of sampling (>25°C), the samples were immediately cooled upon collection and RPDs between the primary and inter-laboratory duplicate sample were within control limits, this minor temperature exceedance is not anticipated to have resulted in volatile losses.

2. Sample Holding Times

Samples were analysed up to 15 and 8 days outside of recommended holding times for pH (6hr holding time) and dissolved major cations (calcium, magnesium, sodium and potassium) (7 day holding time), respectively, in samples SW091, SW086, SW123 and SW075 of ES2045382 and, SW007 and QC100 of ES2045525.

There is the potential for pH and dissolved major cations to have degraded over time and not be representative of field conditions. In particular, it is noted laboratory pH results were generally lower than field pH measurements indicating the potential under reporting of this parameter.

As these analytes are not considered a contaminant of potential concern (COPC) for these samples, the potential for under or over reporting is not considered to materially affect the interpretation of results, however, should be taken into consideration when using the data for interpretive purposes.

3. Limits of reporting

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. Frequency of laboratory QA/QC

The frequency of laboratory QA/QC were adequate across all analytical methods, with the exception of the following in laboratory batch ES2045382:

- Laboratory duplicates were not reported for PFAS analytes. 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.
- Matrix spikes were not reported for PFAS analytes. The accuracy of the data can be assessed as acceptable based on method blanks and laboratory control spike results, which were reported at the required frequencies and within control limits for these analytes.

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5. Laboratory duplicate RPDs	Laboratory duplicate RPDs were reported within control limits, with the exception of laboratory duplicate RPDs for surface water samples in laboratory batch ES2045525 for bicarbonate alkalinity as $CaCO_3$ and total alkalinity as $CaCO_3$, which were both reported marginally above of the 0-20% control limit (26.4%). As there are no adopted guideline values for surface water for bicarbonate alkalinity and total alkalinity, the elevated laboratory duplicate RPDs are not expected to affect the interpretation of results against guideline values. However, the elevated RPDs should be taken into consideration when using the data quantitatively. ALS Laboratory commented on the certificate of analysis (COA) that poor duplicate precision for alkalinity was due to insufficient sample provided for analysis.
6. Other comments	• TDS by method EA-015 may bias high for QC100 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper. • ED037: Poor duplicate precision for Alkalinity. However, insufficient sample has been provided for confirmation analysis.

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Surface Water Blank Sample Analytical Results
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		15/12/2020	21/12/2020	15/12/2020	21/12/2020	15/12/2020	21/12/2020
	Matrix Type		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Lab Report Number		ES2045382	ES2045525	ES2045382	ES2045525	ES2045382	ES2045525
	Sample Type		Rinsate	Rinsate	Field Blank	Field Blank	Trip Blank	Trip Blank
	Field ID		1200_QC300_201215	1200_QC300_201221	1200_QC400_201215	1200_QC400_201221	1200_QC500_201215	1200_QC500_201221
ChemName	Unit	PQL						
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
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	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
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	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
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	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
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	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
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	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
Perfluorobutanoic acid (PFBA)	µg/L	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
Perfluorodecanoic acid (PFDA)	µg/L	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
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	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
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<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	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	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
Perfluoropentanoic acid (PFPeA)	µg/L	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
Perfluorotridecanoic acid (PFTrDA)	µg/L	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
Sum of PFAS	µg/L	0.01	<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	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	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	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Surface Water Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		21/12/2020	21/12/2020	RPD	21/12/2020	21/12/2020	RPD
	Matrix Type		Water	Water		Water	Water	
	Lab Report Number		ES2045525	ES2045525		ES2045525	AECO006/210106	
	Sample Type		Primary	Intralab Duplicate		Primary	Interlab Duplicate	
	Field ID		1200_SW059_201221	1200_QC100_201221		1200_SW059_201221	1200_QC200_201221	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<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	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<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	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<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	<0.05	<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	<0.02	<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	<0.01	<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	0.02	<0.02	<0.02	0	<0.02	<0.01	0

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

Groundwater Blank Sample Analytical Results
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		4/11/2020	5/11/2020	4/11/2020	5/11/2020	4/11/2020	5/11/2020
	Matrix Type		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
	Lab Report Number		ES2039161	ES2039161	ES2039161	ES2039161	ES2039161	ES2039161
	Sample Type		Rinsate	Rinsate	Field Blank	Field Blank	Trip Blank	Trip Blank
	Field ID		1200_QC300_201104	1200_QC301_201105	1200_QC400_201104	1200_QC401_201105	1200_QC500_201104	1200_QC501_201105
ChemName	Unit	PQL						
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
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	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
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	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
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	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
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	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
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	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
Perfluorobutanoic acid (PFBA)	µg/L	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
Perfluorodecanoic acid (PFDA)	µg/L	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
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	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
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<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	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	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
Perfluoropentanoic acid (PFPeA)	µg/L	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
Perfluorotridecanoic acid (PFTrDA)	µg/L	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
Sum of PFAS	µg/L	0.01	<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	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	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	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Groundwater Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		4/11/2020	4/11/2020	RPD	4/11/2020	4/11/2020	RPD
	Sample ID		MW066	QC100		MW032	QC101	
	Lab Report Number		ES2039161	ES2039161		ES2039161	ES2039161	
	Sample Type		Primary	Intralab Duplicate		Primary	Intralab Duplicate	
	Field ID		1200_MW066_201104	1200_QC100_201104		1200_MW032_201104	1200_QC101_201104	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.1	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	0.03	0.03	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	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	<0.05	<0.05	0	<0.05	<0.05	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	<0.02	<0.02	0	<0.02	<0.02	0
Sum of PFAS	µg/L	0.01	0.48	0.45	6	0.04	0.03	29
Sum of PFHxS and PFOS	µg/L	0.01	0.43	0.4	7	0.04	0.03	29
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.34	0.3	13	0.04	0.03	29
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	0.02	0.02	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	0.09	0.1	11	<0.02	<0.02	0

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

Groundwater Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		5/11/2020	5/11/2020	RPD	4/11/2020	4/11/2020	RPD
	Sample ID		MW001	QC102		MW066	QC200	
	Lab Report Number		ES2039161	ES2039161		ES2039161	RN1294247	
	Sample Type		Primary	Intralab Duplicate		Primary	Intralab Duplicate	
	Field ID		1200_MW001_201105	1200_QC102_201105		1200_MW066_201104	1200_QC200_201104	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<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	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA	µg/L	0.02	<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	<0.02	<0.02	0	<0.02	0.011	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	0.03	0.028	7
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	0.012	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	<0.05	<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	<0.02	<0.02	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	0.23	0.21	9	0.48	0.583	19
Sum of PFHxS and PFOS	µg/L	0.01	0.23	0.21	9	0.43	0.418	3
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.17	0.15	13	0.34	0.35	3
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	0.02	0.015	29
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	0.06	0.06	0	0.09	0.068	28

Notes:
**High RPDs are in bold (Acceptable RPDs for each PQL multiplier range are: 200 (1-10 x
***Interlab Duplicates are matched on a per compound basis as methods vary between

Groundwater Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		4/11/2020	4/11/2020	RPD	5/11/2020	5/11/2020	RPD
	Sample ID		MW032	QC201		MW001	QC202	
	Lab Report Number		ES2039161	RN1294247		ES2039161	RN1294247	
	Sample Type		Primary	Interlab Duplicate		Primary	Interlab Duplicate	
	Field ID		1200_MW032_201104	1200_QC201_201104		1200_MW001_201105	1200_QC202_201105	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.01	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.02	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.01	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	<0.05	<0.02	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA	µg/L	0.02	<0.02	<0.01	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	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.05	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	0.018	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.01	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.01	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	<0.05	<0.02	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	<0.02	<0.01	0	<0.02	<0.01	0
Sum of PFAS	µg/L	0.01	0.04	0.146	114	0.23	0.194	17
Sum of PFHxS and PFOS	µg/L	0.01	0.04	0.128	105	0.23	0.194	17
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.04	0.1	86	0.17	0.14	19
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	0.028	33	0.06	0.054	11

Notes:
**High RPDs are in bold (Acceptable RPDs for each PQL multiplier range are: 200 (1-10 x
***Interlab Duplicates are matched on a per compound basis as methods vary between

Surface Water Blank Sample Analytical Results
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		15/12/2020	21/12/2020	15/12/2020	21/12/2020	15/12/2020	21/12/2020
	Matrix Type		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
	Lab Report Number		ES2045382	ES2045525	ES2045382	ES2045525	ES2045382	ES2045525
	Sample Type		Rinsate	Rinsate	Field Blank	Field Blank	Trip Blank	Trip Blank
	Field ID		1200_QC300_201215	1200_QC300_201221	1200_QC400_201215	1200_QC400_201221	1200_QC500_201215	1200_QC500_201221
ChemName	Unit	PQL						
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
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	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
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	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
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	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
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	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
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	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
Perfluorobutanoic acid (PFBA)	µg/L	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
Perfluorodecanoic acid (PFDA)	µg/L	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
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	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
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<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	<0.02
Perfluorooctane sulfonamide (FOSA)	µg/L	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
Perfluoropentanoic acid (PFPeA)	µg/L	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
Perfluorotridecanoic acid (PFTrDA)	µg/L	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
Sum of PFAS	µg/L	0.01	<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	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	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	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Surface Water Relative Percentage Differences
PFAS OMP 3 Year Monitoring
Department of Defence- RAAF Robertson

	Date		21/12/2020	21/12/2020	RPD	21/12/2020	21/12/2020	RPD
	Matrix Type		Water	Water		Water	Water	
	Lab Report Number		ES2045525	ES2045525		ES2045525	AECO006/210106	
	Sample Type		Primary	Intralab Duplicate		Primary	Interlab Duplicate	
	Field ID		1200_SW059_201221	1200_QC100_201221		1200_SW059_201221	1200_QC200_201221	
ChemName	Unit	PQL						
PFAS Full Suite								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.01	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.02	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<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	<0.05	<0.05	0	<0.05	<0.02	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<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	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<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	<0.05	<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	<0.02	<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	<0.01	<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	0.02	<0.02	<0.02	0	<0.02	<0.01	0

Notes:
**High RPDs are in bold (Acceptable RPDs for each PQL multiplier range are: 200 (1-10 x PQL); 50 (10-20 x PQL); 30 (> 20 x PQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix E

Laboratory Certificates

CHAIN OF CUSTODY

ALS COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE: [redacted]

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

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	[redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5/11/20 9am	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: 5.2 °C

Other comments:

AECOM61/201109/2

Due 16/11/20 17/11/2020

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	1200_MW004D_201104		04/11/2020 03:18 PM	Water	ALS: 4 Non ALS: 0	No	X			
011	1200_MW012D_201104		04/11/2020 03:38 PM	Water	ALS: 4 Non ALS: 0	No	X			
012	1200_MW012_201104		04/11/2020 03:39 PM	Water	ALS: 4 Non ALS: 0	No	X			
013	1200_MW034_201104		04/11/2020 03:59 PM	Water	ALS: 2 Non ALS: 0	No		X		
014	1200_MW066_201104		04/11/2020 04:19 PM	Water	ALS: 2 Non ALS: 0	No		X		
015	1200_QC100_201104		04/11/2020 04:20 PM	Water	ALS: 2 Non ALS: 0	No		X		
016	1200_MW032_201104		04/11/2020 04:46 PM	Water	ALS: 2 Non ALS: 0	No		X		
017	1200_QC101_201104		04/11/2020 04:47 PM	Water	ALS: 2 Non ALS: 0	No		X		
018	1200_QC200_201104	Please forward to NMI Sydney	04/11/2020 04:21 PM	Water	ALS: 2 Non ALS: 0	Yes		-	N20/026404	

RECEIVED 09 NOV 2020 BY: [redacted]

CHAIN OF CUSTODY

(ALS) COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ ES2019AECOMAU003 0

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5/11/20 9am	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: 5.2 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	1200_QC201_201104	Please forward to NMI Sydney	04/11/2020 04:48 PM	Water	ALS: 2 Non ALS: 0	Yes		-		N20/026405
020	1200_QC400_201104		04/11/2020 05:56 PM	Water	ALS: 2 Non ALS: 0	No		X		
021	1200_QC300_201104		04/11/2020 05:59 PM	Water	ALS: 2 Non ALS: 0	No		X		
022	1200_QC500_201104		04/11/2020 06:34 PM	Water	ALS: 2 Non ALS: 0	No		X		
023	1200_MW005_201105		05/11/2020 08:44 AM	Water	ALS: 4 Non ALS: 0	No	X			
024	1200_MW001_201105		05/11/2020 09:14 AM	Water	ALS: 2 Non ALS: 0	No		X		
025	1200_QC202_201105	please forward to NMI Sydney	05/11/2020 09:15 AM	Water	ALS: 2 Non ALS: 0	Yes		-		N20/026406
026	1200_QC102_201105		05/11/2020 09:18 AM	Water	ALS: 2 Non ALS: 0	No		X		
027	1200_QC301_201105		05/11/2020 10:53 AM	Water	ALS: 2 Non ALS: 0	No		X		

RECEIVED 09 NOV 2020 BY: .....

CHAIN OF CUSTODY

COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: +614 34 865 / ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 5/11/20 9am	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: 9.2 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	1200_QC401_201105		05/11/2020 10:54 AM	Water	ALS: 2 Non ALS: 0	No		X		
029	1200_QC501_201105		05/11/2020 10:54 AM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

ALS COC#: 15533 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5/11/20 [illegible]	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted] / ES2019AECOMAU0030

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? (Yes) No N/A

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

Random Sample Temperature on Receipt: 5.2 °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	1200_MW021_201104	HDPE (no PTFE)	20 mL	00350019120032	Grey	No	
001	1200_MW021_201104	HDPE (no PTFE)	20 mL	00350019119822	Grey	No	
001	1200_MW021_201104	Clear Plastic Bottle - Natural	500 mL	00071119029258	Green	No	
001	1200_MW021_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018035291	Purple	No	
002	1200_MW021D_201104	HDPE (no PTFE)	20 mL	00351210119818	Grey	No	
002	1200_MW021D_201104	HDPE (no PTFE)	20 mL	00350019120025	Grey	No	
002	1200_MW021D_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033322	Purple	No	
002	1200_MW021D_201104	Clear Plastic Bottle - Natural	500 mL	00071119029333	Green	No	
003	1200_MW031_201104	HDPE (no PTFE)	20 mL	00350019160954	Grey	No	
003	1200_MW031_201104	HDPE (no PTFE)	20 mL	00350019161170	Grey	No	
004	1200_MW018_201104	HDPE (no PTFE)	20 mL	00350019161082	Grey	No	
004	1200_MW018_201104	HDPE (no PTFE)	20 mL	00350019161202	Grey	No	
005	1200_MW113-FF_201104	HDPE (no PTFE)	20 mL	00350019161120	Grey	No	
005	1200_MW113-FF_201104	HDPE (no PTFE)	20 mL	00350019161090	Grey	No	
006	1200_MW113_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033316	Purple	No	
006	1200_MW113_201104	HDPE (no PTFE)	20 mL	00350019161065	Grey	No	
006	1200_MW113_201104	HDPE (no PTFE)	20 mL	00350019161223	Grey	No	
006	1200_MW113_201104	Clear Plastic Bottle - Natural	500 mL	00071119029262	Green	No	
007	1200_MW112-FF_201104	HDPE (no PTFE)	20 mL	00350019161160	Grey	No	
007	1200_MW112-FF_201104	HDPE (no PTFE)	20 mL	00350019161155	Grey	No	
008	1200_MW112_201104	Clear Plastic Bottle - Natural	500 mL	00071119029352	Green	No	
008	1200_MW112_201104	HDPE (no PTFE)	20 mL	00350019161009	Grey	No	
008	1200_MW112_201104	HDPE (no PTFE)	20 mL	00350019161169	Grey	No	
008	1200_MW112_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033362	Purple	No	
009	1200_MW029_201104	HDPE (no PTFE)	20 mL	00350019161242	Grey	No	
009	1200_MW029_201104	HDPE (no PTFE)	20 mL	00350019161164	Grey	No	

CHAIN OF CUSTODY

COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:		RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 5/11/20	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: 5.2 °C

Other comments:

010	1200_MW004D_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033329	Purple	No	
010	1200_MW004D_201104	Clear Plastic Bottle - Natural	500 mL	00071119029261	Green	No	
010	1200_MW004D_201104	HDPE (no PTFE)	20 mL	00350019161097	Grey	No	
010	1200_MW004D_201104	HDPE (no PTFE)	20 mL	00350019160982	Grey	No	
011	1200_MW012D_201104	HDPE (no PTFE)	20 mL	00350019002330	Grey	No	
011	1200_MW012D_201104	HDPE (no PTFE)	20 mL	00350019002422	Grey	No	
011	1200_MW012D_201104	Clear Plastic Bottle - Natural	500 mL	00071119029342	Green	No	
011	1200_MW012D_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033297	Purple	No	
012	1200_MW012_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033294	Purple	No	
012	1200_MW012_201104	HDPE (no PTFE)	20 mL	00350019119827	Grey	No	
012	1200_MW012_201104	HDPE (no PTFE)	20 mL	00350019118957	Grey	No	
012	1200_MW012_201104	Clear Plastic Bottle - Natural	500 mL	00071119029353	Green	No	
013	1200_MW034_201104	HDPE (no PTFE)	20 mL	00350019002481	Grey	No	
013	1200_MW034_201104	HDPE (no PTFE)	20 mL	00350019002328	Grey	No	
014	1200_MW066_201104	HDPE (no PTFE)	20 mL	00350019002529	Grey	No	
014	1200_MW066_201104	HDPE (no PTFE)	20 mL	00350019002377	Grey	No	
015	1200_QC100_201104	HDPE (no PTFE)	20 mL	00350019002498	Grey	No	
015	1200_QC100_201104	HDPE (no PTFE)	20 mL	00350019002514	Grey	No	
016	1200_MW032_201104	HDPE (no PTFE)	20 mL	00350019161007	Grey	No	
016	1200_MW032_201104	HDPE (no PTFE)	20 mL	00350019161079	Grey	No	
017	1200_QC101_201104	HDPE (no PTFE)	20 mL	00350019161185	Grey	No	
017	1200_QC101_201104	HDPE (no PTFE)	20 mL	00350019161237	Grey	No	
018	1200_QC200_201104	HDPE (no PTFE)	20 mL	00350019002224	Grey	No	
018	1200_QC200_201104	HDPE (no PTFE)	20 mL	00350019002309	Grey	No	
019	1200_QC201_201104	HDPE (no PTFE)	20 mL	00350019161069	Grey	No	
019	1200_QC201_201104	HDPE (no PTFE)	20 mL	00350019161050	Grey	No	
020	1200_QC400_201104	HDPE (no PTFE)	20 mL	00350019043794	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ ES2019AECOMAU0030

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5 minute goose	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: 5-2 °C

Other comments:

020	1200_QC400_201104	HDPE (no PTFE)	20 mL	00350019043806	Grey	No	
021	1200_QC300_201104	HDPE (no PTFE)	20 mL	00350019043764	Grey	No	
021	1200_QC300_201104	HDPE (no PTFE)	20 mL	00350019043981	Grey	No	
022	1200_QC500_201104	HDPE (no PTFE)	20 mL	00350019044021	Grey	No	
022	1200_QC500_201104	HDPE (no PTFE)	20 mL	00350019044007	Grey	No	
023	1200_MW005_201105	Clear Plastic Bottle - Natural	500 mL	00071119029349	Green	No	
023	1200_MW005_201105	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033328	Purple	No	
023	1200_MW005_201105	HDPE (no PTFE)	20 mL	00350019002262	Grey	No	
023	1200_MW005_201105	HDPE (no PTFE)	20 mL	00350019002483	Grey	No	
024	1200_MW001_201105	HDPE (no PTFE)	20 mL	00350019160968	Grey	No	
024	1200_MW001_201105	HDPE (no PTFE)	20 mL	00350019161042	Grey	No	
025	1200_QC202_201105	HDPE (no PTFE)	20 mL	00350019161157	Grey	No	
025	1200_QC202_201105	HDPE (no PTFE)	20 mL	00350019161165	Grey	No	
026	1200_QC102_201105	HDPE (no PTFE)	20 mL	00350019161106	Grey	No	
026	1200_QC102_201105	HDPE (no PTFE)	20 mL	00350019161163	Grey	No	
027	1200_QC301_201105	HDPE (no PTFE)	20 mL	00350019161108	Grey	No	
027	1200_QC301_201105	HDPE (no PTFE)	20 mL	00350019161093	Grey	No	
028	1200_QC401_201105	HDPE (no PTFE)	20 mL	00350019161101	Grey	No	
028	1200_QC401_201105	HDPE (no PTFE)	20 mL	00350019161179	Grey	No	
029	1200_QC501_201105	HDPE (no PTFE)	20 mL	00350019161040	Grey	No	
029	1200_QC501_201105	HDPE (no PTFE)	20 mL	00350019161115	Grey	No	

Total Bottle Count: ALS: 74, Non ALS: 0

13.11.20

CHAIN OF CUSTODY

(ALS) COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted] / ES2019AECOMAU0030

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5/11/20 9am	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: 5.2 °C

Other comments:

Environmental Division Sydney

Work Order Reference

ES2039161

Telephone : +61-2-8784 8555

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	1200_MW021_201104		04/11/2020 10:54 AM	Water	ALS: 4 Non ALS: 0	No	X			
002	1200_MW021D_201104		04/11/2020 12:05 PM	Water	ALS: 4 Non ALS: 0	No	X			
003	1200_MW031_201104		04/11/2020 12:01 PM	Water	ALS: 2 Non ALS: 0	No		X		
004	1200_MW018_201104		04/11/2020 12:16 PM	Water	ALS: 2 Non ALS: 0	No		X		
005	1200_MW113-FF_201104		04/11/2020 02:12 PM	Water	ALS: 2 Non ALS: 0	No		X		
006	1200_MW113_201104		04/11/2020 02:13 PM	Water	ALS: 4 Non ALS: 0	No	X			
007	1200_MW112-FF_201104		04/11/2020 02:14 PM	Water	ALS: 2 Non ALS: 0	No		X		
008	1200_MW112_201104		04/11/2020 02:15 PM	Water	ALS: 4 Non ALS: 0	No	X			
009	1200_MW029_201104		04/11/2020 02:16 PM	Water	ALS: 2 Non ALS: 0	No		X		

Australian Government
Department of Industry, Science, Energy and Resources

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

[redacted]

LABORATORY DETAILS

[redacted]

SAMPLE DETAILS

NMI Job Name: AECO06/201109/2

Total No. of Samples: 3

LRNs	Estimated Report Date	Customer Sample ID	Lab Sample Description
N20/026404	17-NOV-2020	1200_QC200_201104	WATER 04/11/2020 04:21 PM
N20/026405	17-NOV-2020	1200_QC201_201104	WATER 04/11/2020 04:48 PM
N20/026406	17-NOV-2020	1200_QC202_201105	WATER 05/11/2020 09:15 AM

SAMPLE RECEIVED CONDITION

Date samples received:	9-NOV-2020
Sample received in good order:	Yes
NMI Quotation no. provided:	
Client purchase order number:	60612561_2_1
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

Client	: AECOM AUSTRALIA PTY LTD	**Job No.**	: AECO06/201109/2
	LEVEL 8	**Quote No.**	: QT-02018
	540 WICKHAM STREET	**Order No.**	: 60612561_2_1
		Date Received	: 09-NOV-2020
Attention	: [redacted]	**Sampled By**	: CLIENT
Project Name	: 1200_NT_PFASOMP		
Your Client Services Manager	: [redacted]	**Phone**	: [redacted]

Lab Reg No.	Sample Ref	Sample Description
N20/026404	1200_QC200_201104	WATER 04/11/2020 04:21 PM
N20/026405	1200_QC201_201104	WATER 04/11/2020 04:48 PM
N20/026406	1200_QC202_201105	WATER 05/11/2020 09:15 AM

Lab Reg No.		N20/026404	N20/026405	N20/026406		
Date Sampled		04-NOV-2020	04-NOV-2020	05-NOV-2020		
	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	0.028	0.018	<0.01		NR70
PFHpA (375-85-9)	ug/L	<0.01	<0.01	<0.01		NR70
PFOA (335-67-1)	ug/L	0.015	<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	0.012	<0.01	<0.01		NR70
PFHxS (355-46-4)	ug/L	0.068	0.028	0.054		NR70
PFHpS (375-92-8)	ug/L	<0.01	<0.01	<0.01		NR70
PFOS (1763-23-1)	ug/L	0.35	0.10	0.14		NR70
PFNS (68259-12-1)	ug/L	<0.01	<0.01	<0.01		NR70
PFBS (375-73-5)	ug/L	0.011	<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. RN1294247

Lab Reg No.		N20/026404	N20/026405	N20/026406		
Date Sampled		04-NOV-2020	04-NOV-2020	05-NOV-2020		
	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)	%	92	94	99		NR70
PFPeA (Surrogate Recovery)	%	80	87	92		NR70
PFHxA (Surrogate Recovery)	%	80	84	102		NR70
PFHpA (Surrogate Recovery)	%	82	85	105		NR70
PFOA (Surrogate Recovery)	%	86	87	101		NR70
PFNA (Surrogate Recovery)	%	66	78	81		NR70
PFDA (Surrogate Recovery)	%	68	61	78		NR70
PFUdA (Surrogate Recovery)	%	60	51	68		NR70
PFDoA (Surrogate Recovery)	%	52	43	78		NR70
PFTeDA (Surrogate Recovery)	%	60	48	57		NR70
PFHxDA (Surrogate Recovery)	%	65	59	70		NR70
FOUEA (Surrogate Recovery)	%	65	75	109		NR70
PFBS (Surrogate Recovery)	%	91	88	102		NR70
PFHxS (Surrogate Recovery)	%	94	86	101		NR70
PFOS (Surrogate Recovery)	%	56	81	82		NR70
PFOSA (Surrogate Recovery)	%	55	58	65		NR70
N-MeFOSA (Surrogate Recovery)	%	48	41	63		NR70
N-EtFOSA (Surrogate Recovery)	%	47	38	60		NR70
N-MeFOSAA (Surrogate Recovery)	%	51	38	84		NR70
N-EtFOSAA (Surrogate Recovery)	%	57	52	56		NR70
N-MeFOSE (Surrogate Recovery)	%	56	52	109		NR70
N-EtFOSE (Surrogate Recovery)	%	84	37	58		NR70
4:2 FTS (Surrogate Recovery)	%	69	61	84		NR70
6:2 FTS (Surrogate Recovery)	%	65	61	68		NR70
8:2 FTS (Surrogate Recovery)	%	61	59	60		NR70
8:2 diPAP (Surrogate Recovery)	%	42	25	38		NR70
Dates						
Date extracted		11-NOV-2020	11-NOV-2020	11-NOV-2020		
Date analysed		11-NOV-2020	11-NOV-2020	11-NOV-2020		

N20/026404
to
N20/026406

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.

Selected PFAS surrogate recoveries are biased due to matrix effects.ô
Surrogate recoveries low for selected analytes - PFAS LORs not raised since S/N >10.

[redacted]

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

17-NOV-2020

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: *RN1294233*

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

CHAIN OF CUSTODY

ALS COC#: 17318 ALS Laboratory: ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: NT_1200_PFASOMP

SITE: Robertson

ORDER NO: 60612561

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:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
[redacted]	[redacted]		[redacted]
DATE TIME: 22/12/20 10am.	DATE TIME: 22/12/20	DATE TIME:	DATE TIME: 23/12/20 7.30am 12.8°C

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: 1.0 13/1 °C

Other comments: AEC006/200106 DUE. 15/01/21

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Waters WATER	Surface Waters - Fresh WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	1200_SW001_201221	Extra for lab QC	21/12/2020 01:06 PM	Water	ALS: 3 Non ALS: 0	No	X			
002	1200_SW007_201221	Extra for QC	21/12/2020 01:31 PM	Water	ALS: 7 Non ALS: 0	No		X		
003	1200_QC100_201221		21/12/2020 01:38 PM	Water	ALS: 6 Non ALS: 0	No		X		
004	1200_QC200_201221	Please forward to NMI	21/12/2020 01:39 PM	Water	ALS: 5 Non ALS: 0	No		X		
005	1200_SW059_201221		21/12/2020 02:12 PM	Water	ALS: 3 Non ALS: 0	No	X			
006	1200_QC300_201221		21/12/2020 02:33 PM	Water	ALS: 2 Non ALS: 0	No	X			
007	1200_QC400_201221		21/12/2020 02:33 PM	Water	ALS: 2 Non ALS: 0	No	X			
008	1200_QC500_201221		21/12/2020 02:34 PM	Water	ALS: 2 Non ALS: 0	No	X			

Subcon / Forward Lab / Split WO

Lab / Analysis: NMI QC200_201221

Organised By / Date:

Relinquished By / Date:

Connote / Courier:

WO No:

Attached By PO / Internal Sheet:

N20/031727

Received in 6 Vials
2 → Small bottle
2 → 300 ml

RECEIVED
24 DEC 2020
C.

Environmental Division Sydney
Work Order Reference
ES2045525

Telephone : +61-2-8784 8555

LAB OF ORIGIN DARWIN

[redacted]

From: [redacted]
Sent: Wednesday, 6 January 2021 11:48 AM
To: [redacted]
Subject: ALS Workorder ES2045525, Client AECOMAU, Project NT_1200_PFASOMP

[redacted]

Please see below for analysis:

Surface Waters - Fresh

- pH
- TDS
- TSS
- Standard cations and anions + ionic balance (Na, K, Ca, Mg, SO4, Cl, Alkalinity, Fluoride)
- PFAS – 28 analytes
- DOC

Best regards,

[redacted]

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Recent releases (click to access directly):
EnviroMail™ 127 – Bacterial Diversity Profiling in NGS
EnviroMail™ 128 – Revised PFAS Bottle Requirements

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www.alsglobal.com

Australian Government
Department of Industry, Science, Energy and Resources

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

CUSTOMER DETAILS

[redacted]

LABORATORY DETAILS

[redacted]

SAMPLE DETAILS

NMI Job Name: AECO06/210106

Total No. of Samples: 1

LRNs	Estimated Report Date	Customer Sample ID	Lab Sample Description
N20/031727	15-JAN-2021	1200_QC200_201221	WATER 21/12/2020 13:39

SAMPLE RECEIVED CONDITION

Date samples received:	6-JAN-2021
Sample received in good order:	Yes
NMI Quotation no. provided:	NT_1200_PFASOMP
Client purchase order number:	60612561
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

REPORT OF ANALYSIS

Client	: AECOM AUSTRALIA PTY LTD	**Job No.**	: AECO06/210106
	LEVEL 8	**Quote No.**	: QT-02018
	540 WICKHAM STREET	**Order No.**	: 60612561
		Date Received	: 06-JAN-2021
Attention	: [redacted]	**Sampled By**	: CLIENT
Project Name	: NT_1200_PFASOMP		
Your Client Services Manager	: [redacted]	**Phone**	: [redacted]

Lab Reg No.	Sample Ref	Sample Description
N20/031727	1200_QC200_201221	WATER 21/12/2020 13:39

Lab Reg No.		N20/031727				
Date Sampled		21-DEC-2020				
	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

Lab Reg No.		N20/031727				
Date Sampled		21-DEC-2020				
	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)	%	116				NR70
PFPeA (Surrogate Recovery)	%	95				NR70
PFHxA (Surrogate Recovery)	%	91				NR70
PFHpA (Surrogate Recovery)	%	99				NR70
PFOA (Surrogate Recovery)	%	97				NR70
PFNA (Surrogate Recovery)	%	97				NR70
PFDA (Surrogate Recovery)	%	87				NR70
PFUdA (Surrogate Recovery)	%	79				NR70
PFDoA (Surrogate Recovery)	%	66				NR70
PFTeDA (Surrogate Recovery)	%	70				NR70
PFHxDA (Surrogate Recovery)	%	67				NR70
FOUEA (Surrogate Recovery)	%	53				NR70
PFBS (Surrogate Recovery)	%	102				NR70
PFHxS (Surrogate Recovery)	%	101				NR70
PFOS (Surrogate Recovery)	%	100				NR70
PFOSA (Surrogate Recovery)	%	67				NR70
N-MeFOSA (Surrogate Recovery)	%	40				NR70
N-EtFOSA (Surrogate Recovery)	%	60				NR70
N-MeFOSAA (Surrogate Recovery)	%	69				NR70
N-EtFOSAA (Surrogate Recovery)	%	66				NR70
N-MeFOSE (Surrogate Recovery)	%	34				NR70
N-EtFOSE (Surrogate Recovery)	%	110				NR70
4:2 FTS (Surrogate Recovery)	%	90				NR70
6:2 FTS (Surrogate Recovery)	%	89				NR70
8:2 FTS (Surrogate Recovery)	%	89				NR70
8:2 diPAP (Surrogate Recovery)	%	148				NR70
Dates						
Date extracted		11-JAN-2021				
Date analysed		13-JAN-2021				

N20/031727
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.

Selected PFAS surrogate recoveries are biased due to matrix effects.ô

REPORT OF ANALYSIS

Surrogate recoveries low for selected analytes - PFAS LORs not raised since S/N >10.

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

18-JAN-2021

Lab Reg No.		N20/031727				
Date Sampled		21-DEC-2020				
	Units					Method
Filtered Trace Elements by ICP						
Calcium Filtered	mg/L	1.8				NT2_47
Magnesium Filtered	mg/L	0.58				NT2_47
Potassium Filtered	mg/L	0.28				NT2_47
Sodium Filtered	mg/L	2.6				NT2_47
Dates						
Date extracted		7-JAN-2021				
Date analysed		7-JAN-2021				

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

18-JAN-2021

Lab Reg No.		N20/031727				
Date Sampled		21-DEC-2020				
	Units					Method
Miscellaneous						
Chloride	mg/L	4.0				NW_D3_B14
Anions	meq/L	0				CALC_IONS
Cations	meq/L	0				CALC_IONS
Bicarbonate as CaCO3	mg/L	<5				NW_B1
Carbonate as CaCO3	mg/L	<5				NW_B1
Hydroxide as CaCO3	mg/L	<5				NW_B1
Conductivity	uS/cm	30				NW_B9
Carbon - Dissolved Organic	mg/L	4.6				NW_S15

REPORT OF ANALYSIS

Report No. RN1300711

Lab Reg No.		N20/031727				
Date Sampled		21-DEC-2020				
	Units					Method
Miscellaneous						
Dissolved Solids - Total	mg/L	19				NW_B10A
Sulphate	mg/L	3.4				NW_D10_B14
Suspended Solids - Total	mg/L	180				NW_S13
Fluoride	mg/L	<0.1				NW_B3_B14
Nitrate-N	mg/L	0.021				NWD20
pH	pH_unit	6.1				NW_S11
Dates						
Date extracted		5-JAN-2021				
Date analysed		6-JAN-2021				

N20/031727

Ionic balance could not be calculated as Cation and Anion milliequivalences are 0.

[redacted] Analyst

Inorganics - NSW

Accreditation No. 198

18-JAN-2021

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: *RN1300515* *RN1300636* *RN1300692*

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: AECO06/210106 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
				N20/031727				
PFBA (375-22-4)	NR70	0.05	<0.05	<0.05	<0.05	-	97	NA
PFPeA (2706-90-3)	NR70	0.02	<0.02	<0.02	<0.02	-	84	NA
PFHxA (307-24-4)	NR70	0.01	<0.01	<0.01	<0.01	-	90	NA
PFHpA (375-85-9)	NR70	0.01	<0.01	<0.01	<0.01	-	89	NA
PFOA (335-67-1)	NR70	0.01	<0.01	<0.01	<0.01	-	91	NA
PFNA (375-95-1)	NR70	0.01	<0.01	<0.01	<0.01	-	93	NA
PFDA (335-76-2)	NR70	0.01	<0.01	<0.01	<0.01	-	104	NA
PFUdA (2058-94-8)	NR70	0.01	<0.01	<0.01	<0.01	-	90	NA
PFDoA (307-55-1)	NR70	0.01	<0.01	<0.01	<0.01	-	93	NA
PFTrDA (72629-94-8)	NR70	0.02	<0.02	<0.02	<0.02	-	98	NA
PFTeDA (376-06-7)	NR70	0.02	<0.02	<0.02	<0.02	-	102	NA
PFHxDA (67905-19-5)	NR70	0.02	<0.02	<0.02	<0.02	-	115	NA
PFODA (16517-11-6)	NR70	0.05	<0.05	<0.05	<0.05	-	117	NA
FOUEA (70887-84-2)	NR70	0.01	<0.01	<0.01	<0.01	-	87	NA
PFBS (375-73-5)	NR70	0.01	<0.01	<0.01	<0.01	-	95	NA
PFPeS (2706-91-4)	NR70	0.01	<0.01	<0.01	<0.01	-	92	NA
PFHxS (355-46-4)	NR70	0.01	<0.01	<0.01	<0.01	-	93	NA
PFHpS (375-92-8)	NR70	0.01	<0.01	<0.01	<0.01	-	91	NA
PFOS (1763-23-1)	NR70	0.02	<0.02	<0.02	<0.02	-	93	NA
PFNS (68259-12-1)	NR70	0.01	<0.01	<0.01	<0.01	-	90	NA
PFDS (335-77-3)	NR70	0.01	<0.01	<0.01	<0.01	-	88	NA
PFOSA (754-91-6)	NR70	0.01	<0.01	<0.01	<0.01	-	100	NA
N-MeFOSA (31506-32-8)	NR70	0.02	<0.02	<0.02	<0.02	-	116	NA
N-EtFOSA (4151-50-2)	NR70	0.02	<0.02	<0.02	<0.02	-	118	NA
N-MeFOSAA (2355-31-9)	NR70	0.01	<0.01	<0.01	<0.01	-	92	NA
N-EtFOSAA(2991-50-6)	NR70	0.01	<0.01	<0.01	<0.01	-	90	NA
N-MeFOSE (24448-09-7)	NR70	0.05	<0.05	<0.05	<0.05	-	143	NA
N-EtFOSE (1691-99-2)	NR70	0.05	<0.05	<0.05	<0.05	-	142	NA
4:2 FTS (757124-72-4)	NR70	0.01	<0.01	<0.01	<0.01	-	98	NA
6:2 FTS (27619-97-2)	NR70	0.01	<0.01	<0.01	<0.01	-	100	NA
8:2 FTS (39108-34-4)	NR70	0.01	<0.01	<0.01	<0.01	-	125	NA
10:2 FTS (120226-60-0)	NR70	0.01	<0.01	<0.01	<0.01	-	111	NA
8:2 diPAP (678-41-1)	NR70	0.02	<0.02	<0.02	<0.02	-	86	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: **14/01/2021**

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: AECOM Pty Ltd

NMI QA Report No: AECO06/210106 QA **Sample Matrix:** Water

Analyte	Method	LOR	Blank	Duplicates			Recoveries	
				Sample	Duplicate	RPD	Matrix spk	LCS
		mg/L	mg/L	mg/L	mg/L	%	%	%
Waters Section				N20/031727			N20/031727	
Bicarbonate as CaCO3	NW_B1	5	<5	<5	<5	ND	NA	98
Carbonate as CaCO3	NW_B1	5	<5	<5	<5	ND	NA	NA
Hydroxide as CaCO3	NW_B1	5	<5	<5	<5	ND	NA	NA
Alkalinity - Total as CaCO3	NW_B1	5	<5	<5	NA	NA	NA	98
Fluoride	NW_B3_B14	0.1	<0.1	<0.1	NA	NA	NA	104
Carbon - Dissolved Organic	NW_S15	0.5	<0.5	4.5	4.5	0.0	112	105
pH (pH units)	NW_S11	NA	NA	6.1	NA	NA	NA	101
Chloride	NW_D3_B14	0.1	<0.1	4.1	4	2.5	89	103
Sulphate	NW_D10_B14	0.1	<0.1	3.4	3.4	0.0	85	90
Suspended Solids - Total	NW_S13	2	<2	180	NA	NA	NA	94
Dissolved Solids - Total	NW_B10A	1	<1	19	NA	NA	NA	109
Nitrate-N	NW_D20	0.005	<0.005	0.021	NA	NA	NA	100

Filename = K:\Inorganics\WATER SECTION\AA3 - Low Level Nutrients\Ammonia 2021\

Legend
Acceptable recovery is 80-120%.
Acceptable RPDs on duplicates is 30% at > 5 times LOR. Greater RPD may be expected at < 5 LOR.
LOR = Limit Of Reporting
RPD = Relative Percent Difference
LCS = Laboratory Control Sample.
ND = Not Determined
NA = Not Applicable

Comments
This report shall not be reproduced except in full.
Results greater than ten times LOR have been rounded to two significant figures.

Signed: [redacted]

[redacted]
Inorganics Manager, NMI-North Ryde

Date: **15/01/2021**

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: **AECOM AUS PTY LTD**

NMI QA Report No: **AECO06/210106 T1** **Sample Matrix:** Water

Analyte	Method	LOR	Blank	Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
Inorganics Section				N20/031727				N20/031727
Sodium Filtered	NT2.47	0.05ppm	<0.05ppm	1.8	1.8	0	99	101
Potassium Filtered	NT2.47	0.05ppm	<0.05ppm	0.59	0.58	2	99	100
Calcium Filtered	NT2.47	0.005ppm	<0.005ppm	0.28	0.28	0	96	99
Magnesium Filtered	NT2.47	0.005ppm	<0.005ppm	2.8	2.3	NA	97	100

Filename = N:\North Ryde\Data\Inorganics\Quality System\QA Reports\TE\QAR2021\Water\

Legend:
Acceptable recovery is 75-120%.
Acceptable RPDs on duplicates is 44% at concentrations >5 times LOR. Greater RPD may be expected at <5 times LOR.
LOR = Limit Of Reporting ND = Not Determined
RPD = Relative Percent Difference NA = Not Applicable
LCS = Laboratory Control Sample.
#: Spike level is less than 50% of the sample's concentration, hence the recovery data cannot be reported.
Comments:
Results greater than ten times LOR have been rounded to two significant figures.
This report shall not be reproduced except in full.

Signed: 

Inorganics , NMI-North Ryde
Date: **15/01/2021**

'3-11-20

CHAIN OF CUSTODY

(ALS) COC#: 15533 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 5/11/20 9am	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted] / ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

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

Random Sample Temperature on Receipt: 5.2 °C

Other comments:

Environmental Division Sydney

Work Order Reference

ES2039161

Telephone : +61-2-8784 8555

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	1200_MW021_201104		04/11/2020 10:54 AM	Water	ALS: 4 Non ALS: 0	No	X			
002	1200_MW021D_201104		04/11/2020 12:05 PM	Water	ALS: 4 Non ALS: 0	No	X			
003	1200_MW031_201104		04/11/2020 12:01 PM	Water	ALS: 2 Non ALS: 0	No		X		
004	1200_MW018_201104		04/11/2020 12:16 PM	Water	ALS: 2 Non ALS: 0	No		X		
005	1200_MW113-FF_201104		04/11/2020 02:12 PM	Water	ALS: 2 Non ALS: 0	No		X		
006	1200_MW113_201104		04/11/2020 02:13 PM	Water	ALS: 4 Non ALS: 0	No	X			
007	1200_MW112-FF_201104		04/11/2020 02:14 PM	Water	ALS: 2 Non ALS: 0	No		X		
008	1200_MW112_201104		04/11/2020 02:15 PM	Water	ALS: 4 Non ALS: 0	No	X			
009	1200_MW029_201104		04/11/2020 02:16 PM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

ALS COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 5/11/20 9am	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: 5.2 °C

Other comments:

SAMPLE DETAILS | **ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	1200_MW004D_201104		04/11/2020 03:18 PM	Water	ALS: 4 Non ALS: 0	No	X			
011	1200_MW012D_201104		04/11/2020 03:38 PM	Water	ALS: 4 Non ALS: 0	No	X			
012	1200_MW012_201104		04/11/2020 03:39 PM	Water	ALS: 4 Non ALS: 0	No	X			
013	1200_MW034_201104		04/11/2020 03:59 PM	Water	ALS: 2 Non ALS: 0	No		X		
014	1200_MW066_201104		04/11/2020 04:19 PM	Water	ALS: 2 Non ALS: 0	No		X		
015	1200_QC100_201104		04/11/2020 04:20 PM	Water	ALS: 2 Non ALS: 0	No		X		
016	1200_MW032_201104		04/11/2020 04:46 PM	Water	ALS: 2 Non ALS: 0	No		X		
017	1200_QC101_201104		04/11/2020 04:47 PM	Water	ALS: 2 Non ALS: 0	No		X		
018	1200_QC200_201104	Olease forward to NMI Sydney	04/11/2020 04:21 PM	Water	ALS: 2 Non ALS: 0	Yes		-		

CHAIN OF CUSTODY

ALS COC#: 15533 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 5/11/20 9am	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE: [redacted]

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: 5.2 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	1200_QC201_201104	Please forward to NMI Sydney	04/11/2020 04:48 PM	Water	ALS: 2 Non ALS: 0	Yes		-		
020	1200_QC400_201104		04/11/2020 05:56 PM	Water	ALS: 2 Non ALS: 0	No		X		
021	1200_QC300_201104		04/11/2020 05:59 PM	Water	ALS: 2 Non ALS: 0	No		X		
022	1200_QC500_201104		04/11/2020 06:34 PM	Water	ALS: 2 Non ALS: 0	No		X		
023	1200_MW005_201105		05/11/2020 08:44 AM	Water	ALS: 4 Non ALS: 0	No	X			
024	1200_MW001_201105		05/11/2020 09:14 AM	Water	ALS: 2 Non ALS: 0	No		X		
025	1200_QC202_201105	please forward to NMI Sydney	05/11/2020 09:15 AM	Water	ALS: 2 Non ALS: 0	Yes		-		
026	1200_QC102_201105		05/11/2020 09:18 AM	Water	ALS: 2 Non ALS: 0	No		X		
027	1200_QC301_201105		05/11/2020 10:53 AM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 15533 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 5/11/20 [illegible]	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted] / ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? (Yes) No N/A

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

Random Sample Temperature on Receipt: 9.2 C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters - Fresh WATER	PFAS Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	1200_QC401_201105		05/11/2020 10:54 AM	Water	ALS: 2 Non ALS: 0	No		X		
029	1200_QC501_201105		05/11/2020 10:54 AM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

ALS COC#: 15533 *ALS Laboratory:* ES Sydney

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ ES2019AECOMAU003 0

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 5/11/20 9:00	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: 5.2 °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	1200_MW021_201104	HDPE (no PTFE)	20 mL	00350019120032	Grey	No	
001	1200_MW021_201104	HDPE (no PTFE)	20 mL	00350019119822	Grey	No	
001	1200_MW021_201104	Clear Plastic Bottle - Natural	500 mL	00071119029258	Green	No	
001	1200_MW021_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018035291	Purple	No	
002	1200_MW021D_201104	HDPE (no PTFE)	20 mL	00351210119818	Grey	No	
002	1200_MW021D_201104	HDPE (no PTFE)	20 mL	00350019120025	Grey	No	
002	1200_MW021D_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033322	Purple	No	
002	1200_MW021D_201104	Clear Plastic Bottle - Natural	500 mL	00071119029333	Green	No	
003	1200_MW031_201104	HDPE (no PTFE)	20 mL	00350019160954	Grey	No	
003	1200_MW031_201104	HDPE (no PTFE)	20 mL	00350019161170	Grey	No	
004	1200_MW018_201104	HDPE (no PTFE)	20 mL	00350019161082	Grey	No	
004	1200_MW018_201104	HDPE (no PTFE)	20 mL	00350019161202	Grey	No	
005	1200_MW113-FF_201104	HDPE (no PTFE)	20 mL	00350019161120	Grey	No	
005	1200_MW113-FF_201104	HDPE (no PTFE)	20 mL	00350019161090	Grey	No	
006	1200_MW113_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033316	Purple	No	
006	1200_MW113_201104	HDPE (no PTFE)	20 mL	00350019161065	Grey	No	
006	1200_MW113_201104	HDPE (no PTFE)	20 mL	00350019161223	Grey	No	
006	1200_MW113_201104	Clear Plastic Bottle - Natural	500 mL	00071119029262	Green	No	
007	1200_MW112-FF_201104	HDPE (no PTFE)	20 mL	00350019161160	Grey	No	
007	1200_MW112-FF_201104	HDPE (no PTFE)	20 mL	00350019161155	Grey	No	
008	1200_MW112_201104	Clear Plastic Bottle - Natural	500 mL	00071119029352	Green	No	
008	1200_MW112_201104	HDPE (no PTFE)	20 mL	00350019161009	Grey	No	
008	1200_MW112_201104	HDPE (no PTFE)	20 mL	00350019161169	Grey	No	
008	1200_MW112_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033362	Purple	No	
009	1200_MW029_201104	HDPE (no PTFE)	20 mL	00350019161242	Grey	No	
009	1200_MW029_201104	HDPE (no PTFE)	20 mL	00350019161164	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 15533 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5/11/20	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ 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: 5.2 °C

Other comments:

010	1200_MW004D_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033329	Purple	No	
010	1200_MW004D_201104	Clear Plastic Bottle - Natural	500 mL	00071119029261	Green	No	
010	1200_MW004D_201104	HDPE (no PTFE)	20 mL	00350019161097	Grey	No	
010	1200_MW004D_201104	HDPE (no PTFE)	20 mL	00350019160982	Grey	No	
011	1200_MW012D_201104	HDPE (no PTFE)	20 mL	00350019002330	Grey	No	
011	1200_MW012D_201104	HDPE (no PTFE)	20 mL	00350019002422	Grey	No	
011	1200_MW012D_201104	Clear Plastic Bottle - Natural	500 mL	00071119029342	Green	No	
011	1200_MW012D_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033297	Purple	No	
012	1200_MW012_201104	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033294	Purple	No	
012	1200_MW012_201104	HDPE (no PTFE)	20 mL	00350019119827	Grey	No	
012	1200_MW012_201104	HDPE (no PTFE)	20 mL	00350019119957	Grey	No	
012	1200_MW012_201104	Clear Plastic Bottle - Natural	500 mL	00071119029353	Green	No	
013	1200_MW034_201104	HDPE (no PTFE)	20 mL	00350019002481	Grey	No	
013	1200_MW034_201104	HDPE (no PTFE)	20 mL	00350019002328	Grey	No	
014	1200_MW066_201104	HDPE (no PTFE)	20 mL	00350019002529	Grey	No	
014	1200_MW066_201104	HDPE (no PTFE)	20 mL	00350019002377	Grey	No	
015	1200_QC100_201104	HDPE (no PTFE)	20 mL	00350019002498	Grey	No	
015	1200_QC100_201104	HDPE (no PTFE)	20 mL	00350019002514	Grey	No	
016	1200_MW032_201104	HDPE (no PTFE)	20 mL	00350019161007	Grey	No	
016	1200_MW032_201104	HDPE (no PTFE)	20 mL	00350019161079	Grey	No	
017	1200_QC101_201104	HDPE (no PTFE)	20 mL	00350019161185	Grey	No	
017	1200_QC101_201104	HDPE (no PTFE)	20 mL	00350019161237	Grey	No	
018	1200_QC200_201104	HDPE (no PTFE)	20 mL	00350019002224	Grey	No	
018	1200_QC200_201104	HDPE (no PTFE)	20 mL	00350019002309	Grey	No	
019	1200_QC201_201104	HDPE (no PTFE)	20 mL	00350019161069	Grey	No	
019	1200_QC201_201104	HDPE (no PTFE)	20 mL	00350019161050	Grey	No	
020	1200_QC400_201104	HDPE (no PTFE)	20 mL	00350019043794	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 15533 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 5/11/20 9000	DATE TIME:	DATE TIME:

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: 1200_NT_PFASOMP

SITE: 1200_NT_PFASOMP

ORDER NO: 60612561 2.1

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19 V3

SAMPLER MOBILE: [redacted]

/ 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: 5-2 °C

Other comments:

020	1200_QC400_201104	HDPE (no PTFE)	20 mL	00350019043806	Grey	No	
021	1200_QC300_201104	HDPE (no PTFE)	20 mL	00350019043764	Grey	No	
021	1200_QC300_201104	HDPE (no PTFE)	20 mL	00350019043981	Grey	No	
022	1200_QC500_201104	HDPE (no PTFE)	20 mL	00350019044021	Grey	No	
~~022~~	~~1200_QC500_201104~~	~~HDPE (no PTFE)~~	~~20 mL~~	~~00350019044007~~	~~Grey~~	~~No~~	
023	1200_MW005_201105	Clear Plastic Bottle - Natural	500 mL	00071119029349	Green	No	
023	1200_MW005_201105	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181018033328	Purple	No	
023	1200_MW005_201105	HDPE (no PTFE)	20 mL	00350019002262	Grey	No	
023	1200_MW005_201105	HDPE (no PTFE)	20 mL	00350019002483	Grey	No	
024	1200_MW001_201105	HDPE (no PTFE)	20 mL	00350019160968	Grey	No	
024	1200_MW001_201105	HDPE (no PTFE)	20 mL	00350019161042	Grey	No	
025	1200_QC202_201105	HDPE (no PTFE)	20 mL	00350019161157	Grey	No	
025	1200_QC202_201105	HDPE (no PTFE)	20 mL	00350019161165	Grey	No	
026	1200_QC102_201105	HDPE (no PTFE)	20 mL	00350019161106	Grey	No	
026	1200_QC102_201105	HDPE (no PTFE)	20 mL	00350019161163	Grey	No	
027	1200_QC301_201105	HDPE (no PTFE)	20 mL	00350019161108	Grey	No	
027	1200_QC301_201105	HDPE (no PTFE)	20 mL	00350019161093	Grey	No	
028	1200_QC401_201105	HDPE (no PTFE)	20 mL	00350019161101	Grey	No	
028	1200_QC401_201105	HDPE (no PTFE)	20 mL	00350019161179	Grey	No	
029	1200_QC501_201105	HDPE (no PTFE)	20 mL	00350019161040	Grey	No	
029	1200_QC501_201105	HDPE (no PTFE)	20 mL	00350019161115	Grey	No	

Total Bottle Count: ALS: 74, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2039161**		
Amendment	: **2**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: NT_1200_PFASOMP	Page	: 1 of 3
Order number	: 60612561 2.1	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: 15533	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: 1200_NT_PFASOMP		
Sampler	: [redacted]		

Dates

Date Samples Received	: 06-Nov-2020 09:00	Issue Date	: 15-Jan-2021
Client Requested Due Date	: 13-Nov-2020	Scheduled Reporting Date	: **13-Nov-2020**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 6.6' C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 27 / 27

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Samples QC200, QC201, QC202 have been forwarded 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 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.

ES2039161-005 : 04-Nov-2020 14:12 : 1200_MW113-FF_201104
ES2039161-007 : 04-Nov-2020 14:14 : 1200_MW112-FF_201104

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 - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP002 Dissolved Organic Carbon (DOC)	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02A Ca, Mg, Na, K, Cl, SO4, Alkalinity & Fluoride
ES2039161-001	04-Nov-2020 10:54	1200_MW021_201104	✓	✓	✓	✓	✓
ES2039161-002	04-Nov-2020 12:05	1200_MW021_D_201104	✓	✓	✓	✓	✓
ES2039161-003	04-Nov-2020 12:01	1200_MW031_201104				✓	
ES2039161-004	04-Nov-2020 12:16	1200_MW018_201104				✓	
ES2039161-005	04-Nov-2020 14:12	1200_MW113-FF_201104				✓	
ES2039161-006	04-Nov-2020 14:13	1200_MW113_201104	✓	✓	✓	✓	✓
ES2039161-007	04-Nov-2020 14:14	1200_MW112-FF_201104				✓	
ES2039161-008	04-Nov-2020 14:15	1200_MW112_201104	✓	✓	✓	✓	✓
ES2039161-009	04-Nov-2020 14:16	1200_MW029_201104				✓	
ES2039161-010	04-Nov-2020 15:18	1200_MW004_D_201104	✓	✓	✓	✓	✓
ES2039161-011	04-Nov-2020 18:38	1200_MW012_D_201104	✓	✓	✓	✓	✓
ES2039161-012	04-Nov-2020 15:39	1200_MW012_201104	✓	✓	✓	✓	✓
ES2039161-013	04-Nov-2020 15:59	1200_MW034_201104				✓	
ES2039161-014	04-Nov-2020 16:19	1200_MW066_201104				✓	
ES2039161-015	04-Nov-2020 16:20	1200_QC100_201104				✓	
ES2039161-016	04-Nov-2020 16:46	1200_MW032_201104				✓	
ES2039161-017	04-Nov-2020 16:47	1200_QC101_201104				✓	
ES2039161-020	04-Nov-2020 17:56	1200_QC400_201104				✓	
ES2039161-021	04-Nov-2020 17:59	1200_QC300_201104				✓	
ES2039161-022	04-Nov-2020 18:34	1200_QC500_201104				✓	
ES2039161-023	05-Nov-2020 08:44	1200_MW004_201105	✓	✓	✓	✓	✓
ES2039161-024	05-Nov-2020 09:14	1200_MW001_201105				✓	
ES2039161-026	05-Nov-2020 09:18	1200_QC102_201105				✓	
ES2039161-027	05-Nov-2020 10:53	1200_QC301_201105				✓	
ES2039161-028	05-Nov-2020 10:54	1200_QC401_201105				✓	
ES2039161-029	05-Nov-2020 10:54	1200_QC501_201105				✓	
ES2039161-030	04-Nov-2020 00:00	1200_MW030_201104				✓	

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]

[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 - ESDAT (ESDAT) — Email
- EDI Format - XTab (XTAB) — Email

[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
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- EDI Format - ESDAT (ESDAT) — Email
- EDI Format - XTab (XTAB) — Email

[redacted]

- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[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 - ENMRG (ENMRG) — Email
- EDI Format - ESDAT (ESDAT) — Email
- EDI Format - XTab (XTAB) — Email

[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 - ENMRG (ENMRG) — Email
- EDI Format - ESDAT (ESDAT) — Email
- EDI Format - XTab (XTAB) — Email

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2039161**	Page	: 1 of 19
Amendment	: **2**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 06-Nov-2020 09:00
Order number	: 60612561 2.1	Date Analysis Commenced	: 07-Nov-2020
C-O-C number	: 15533	Issue Date	: 15-Jan-2021 10:41
Sampler	: [redacted]		
Site	: 1200_NT_PFASOMP		
Quote number	: SY/139/19 V3		
No. of samples received	: 27		
No. of samples analysed	: 27		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, 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]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
	LCMS Coordinator	Sydney Organics, Smithfield, NSW
	Analyst	Sydney Inorganics, 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.
- EP231X: Positive 'PFOS' results for samples #16 and #17 confirmed by re-extraction and re-analysis.
- Amendment (18/11/2020): This report has been amended as a result of a request to change sample identification numbers (IDs) and Project ID. All analysis results are as per the previous report.
- Amendment (15/01/2021): This report has been amended as a result of a request to change sample identification numbers (IDs) received by ALS from 1200_MW005_201105 to 1200_MW004_201105 on 15/01/2021. All analysis results are as per the previous report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW021_201104	1200_MW021_D_201104	1200_MW031_201104	1200_MW018_201104	1200_MW113-FF_201104
				Sampling date / time	04-Nov-2020 10:54	04-Nov-2020 12:05	04-Nov-2020 12:01	04-Nov-2020 12:16	04-Nov-2020 14:12
Compound	CAS Number	LOR	Unit		ES2039161-001	ES2039161-002	ES2039161-003	ES2039161-004	ES2039161-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		208	64	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		8	66	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		8	66	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	2	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		5	2	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	7	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	6	----	----	----
Sodium	7440-23-5	1	mg/L		3	9	----	----	----
Potassium	7440-09-7	1	mg/L		<1	3	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	0.1	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		0.30	1.42	----	----	----
ø Total Cations	----	0.01	meq/L		0.13	1.31	----	----	----
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		1	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW021_201104	1200_MW021_D_201104	1200_MW031_201104	1200_MW018_201104	1200_MW113-FF_201104
				Sampling date / time	04-Nov-2020 10:54	04-Nov-2020 12:05	04-Nov-2020 12:01	04-Nov-2020 12:16	04-Nov-2020 14:12
Compound	CAS Number	LOR	Unit		ES2039161-001	ES2039161-002	ES2039161-003	ES2039161-004	ES2039161-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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
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

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW021_201104	1200_MW021_D_201104	1200_MW031_201104	1200_MW018_201104	1200_MW113-FF_201104
				Sampling date / time	04-Nov-2020 10:54	04-Nov-2020 12:05	04-Nov-2020 12:01	04-Nov-2020 12:16	04-Nov-2020 14:12
					ES2039161-001	ES2039161-002	ES2039161-003	ES2039161-004	ES2039161-005
					Result	Result	Result	Result	Result
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	%		**115**	**92.9**	**99.4**	**99.9**	**98.4**
13C8-PFOA	----	0.02	%		**91.9**	**99.5**	**104**	**101**	**99.4**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW113_201104	1200_MW112-FF_201104	1200_MW112_201104	1200_MW029_201104	1200_MW004_D_201104
				Sampling date / time	04-Nov-2020 14:13	04-Nov-2020 14:14	04-Nov-2020 14:15	04-Nov-2020 14:16	04-Nov-2020 15:18
Compound	CAS Number	LOR	Unit		ES2039161-006	ES2039161-007	ES2039161-008	ES2039161-009	ES2039161-010
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	----	<5	----	54
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	<1	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	<1	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		146	----	176	----	167
Total Alkalinity as CaCO3	----	1	mg/L		146	----	176	----	167
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	----	2	----	4
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		4	----	4	----	4
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		31	----	43	----	9
Magnesium	7439-95-4	1	mg/L		9	----	9	----	12
Sodium	7440-23-5	1	mg/L		10	----	11	----	39
Potassium	7440-09-7	1	mg/L		3	----	4	----	4
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.3	----	0.2	----	0.5
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		3.07	----	3.67	----	3.53
ø Total Cations	----	0.01	meq/L		2.80	----	3.47	----	3.24
ø Ionic Balance	----	0.01	%		4.64	----	2.85	----	4.39
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		<1	----	<1	----	3
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW113_201104	1200_MW112-FF_201104	1200_MW112_201104	1200_MW029_201104	1200_MW004_D_201104
				Sampling date / time	04-Nov-2020 14:13	04-Nov-2020 14:14	04-Nov-2020 14:15	04-Nov-2020 14:16	04-Nov-2020 15:18
Compound	CAS Number	LOR	Unit		ES2039161-006	ES2039161-007	ES2039161-008	ES2039161-009	ES2039161-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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
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

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW113_201104	1200_MW112-FF_201104	1200_MW112_201104	1200_MW029_201104	1200_MW004_D_201104
				Sampling date / time	04-Nov-2020 14:13	04-Nov-2020 14:14	04-Nov-2020 14:15	04-Nov-2020 14:16	04-Nov-2020 15:18
					ES2039161-006	ES2039161-007	ES2039161-008	ES2039161-009	ES2039161-010
					Result	Result	Result	Result	Result
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	%		**101**	**102**	**94.5**	**98.9**	**98.1**
13C8-PFOA	----	0.02	%		**101**	**102**	**99.7**	**105**	**106**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW012_D_201104	1200_MW012_201104	1200_MW034_201104	1200_MW066_201104	1200_QC100_201104
				Sampling date / time	04-Nov-2020 18:38	04-Nov-2020 15:39	04-Nov-2020 15:59	04-Nov-2020 16:19	04-Nov-2020 16:20
Compound	CAS Number	LOR	Unit		ES2039161-011	ES2039161-012	ES2039161-013	ES2039161-014	ES2039161-015
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**8**	**42**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**16**	**4**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**16**	**4**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**2**	**2**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	<1	----	----	----
Sodium	7440-23-5	1	mg/L		**6**	**2**	----	----	----
Potassium	7440-09-7	1	mg/L		**1**	<1	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.38**	**0.14**	----	----	----
ø Total Cations	----	0.01	meq/L		**0.29**	**0.09**	----	----	----
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		**3**	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	**0.06**	**0.09**	**0.10**
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	**0.15**	**0.34**	**0.30**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW012_D_201104	1200_MW012_201104	1200_MW034_201104	1200_MW066_201104	1200_QC100_201104
				Sampling date / time	04-Nov-2020 18:38	04-Nov-2020 15:39	04-Nov-2020 15:59	04-Nov-2020 16:19	04-Nov-2020 16:20
Compound	CAS Number	LOR	Unit		ES2039161-011	ES2039161-012	ES2039161-013	ES2039161-014	ES2039161-015
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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	**0.12**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.20**	**0.03**	**0.03**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.09**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.03**	**0.02**	**0.02**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW012_D_201104	1200_MW012_201104	1200_MW034_201104	1200_MW066_201104	1200_QC100_201104
				Sampling date / time	04-Nov-2020 18:38	04-Nov-2020 15:39	04-Nov-2020 15:59	04-Nov-2020 16:19	04-Nov-2020 16:20
					ES2039161-011	ES2039161-012	ES2039161-013	ES2039161-014	ES2039161-015
					Result	Result	Result	Result	Result
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	**0.65**	**0.48**	**0.45**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.21**	**0.43**	**0.40**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.65**	**0.48**	**0.45**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.4**	**102**	**105**	**102**	**97.6**
13C8-PFOA	----	0.02	%		**104**	**104**	**103**	**102**	**103**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW032_201104	1200_QC101_201104	1200_QC400_201104	1200_QC300_201104	1200_QC500_201104
				Sampling date / time	04-Nov-2020 16:46	04-Nov-2020 16:47	04-Nov-2020 17:56	04-Nov-2020 17:59	04-Nov-2020 18:34
					ES2039161-016	ES2039161-017	ES2039161-020	ES2039161-021	ES2039161-022
					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	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.04**	**0.03**	<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: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW032_201104	1200_QC101_201104	1200_QC400_201104	1200_QC300_201104	1200_QC500_201104
				Sampling date / time	04-Nov-2020 16:46	04-Nov-2020 16:47	04-Nov-2020 17:56	04-Nov-2020 17:59	04-Nov-2020 18:34
Compound	CAS Number	LOR	Unit		ES2039161-016	ES2039161-017	ES2039161-020	ES2039161-021	ES2039161-022
					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		**0.04**	**0.03**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	**0.03**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.04**	**0.03**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.5**	**101**	**102**	**99.9**	**116**
13C8-PFOA	----	0.02	%		**99.5**	**105**	**101**	**101**	**102**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW004_201105	1200_MW001_201105	1200_QC102_201105	1200_QC301_201105	1200_QC401_201105
				Sampling date / time	05-Nov-2020 08:44	05-Nov-2020 09:14	05-Nov-2020 09:18	05-Nov-2020 10:53	05-Nov-2020 10:54
Compound	CAS Number	LOR	Unit		ES2039161-023	ES2039161-024	ES2039161-026	ES2039161-027	ES2039161-028
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**1240**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**20**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**20**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**7**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	----	----	----	----
Sodium	7440-23-5	1	mg/L		**8**	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.60**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**0.35**	----	----	----	----
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		**8**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	**0.06**	**0.06**	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.08**	**0.17**	**0.15**	<0.01	<0.01

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW004_201105	1200_MW001_201105	1200_QC102_201105	1200_QC301_201105	1200_QC401_201105
				Sampling date / time	05-Nov-2020 08:44	05-Nov-2020 09:14	05-Nov-2020 09:18	05-Nov-2020 10:53	05-Nov-2020 10:54
Compound	CAS Number	LOR	Unit		ES2039161-023	ES2039161-024	ES2039161-026	ES2039161-027	ES2039161-028
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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
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									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_MW004_201105	1200_MW001_201105	1200_QC102_201105	1200_QC301_201105	1200_QC401_201105
				Sampling date / time	05-Nov-2020 08:44	05-Nov-2020 09:14	05-Nov-2020 09:18	05-Nov-2020 10:53	05-Nov-2020 10:54
Compound	CAS Number	LOR	Unit		ES2039161-023	ES2039161-024	ES2039161-026	ES2039161-027	ES2039161-028
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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		**0.08**	**0.23**	**0.21**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.08**	**0.23**	**0.21**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.08**	**0.23**	**0.21**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**94.0**	**115**	**96.0**	**101**	**97.6**
13C8-PFOA	----	0.02	%		**93.3**	**113**	**102**	**110**	**110**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_QC501_201105	1200_MW030_201104	----	----	----
				Sampling date / time	05-Nov-2020 10:54	04-Nov-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2039161-029	ES2039161-030	--------	--------	--------
					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	0.02	µg/L		<0.02	**0.05**	----	----	----
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	**0.14**	----	----	----
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: GROUNDWATER (Matrix: WATER)				Sample ID	1200_QC501_201105	1200_MW030_201104	----	----	----
				Sampling date / time	05-Nov-2020 10:54	04-Nov-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2039161-029	ES2039161-030	--------	--------	--------
					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	**0.19**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.19**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.19**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**92.9**	**103**	----	----	----
13C8-PFOA	----	0.02	%		**101**	**105**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		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	: **ES2039161**	Page	: 1 of 7
Amendment	: **2**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: [redacted]	Date Samples Received	: 06-Nov-2020
Order number	: [redacted]	Date Analysis Commenced	: 07-Nov-2020
C-O-C number	: [redacted]	Issue Date	: 15-Jan-2021
Sampler	: [redacted]		
Site	: 1200_NT_PFASOMP		
Quote number	: SY/139/19 V3		
No. of samples received	: 27		
No. of samples analysed	: 27		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, 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]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
	LCMS Coordinator	Sydney Organics, Smithfield, NSW
	Analyst	Sydney Inorganics, 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

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 (%)*	*Recovery Limits (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3353867)									
ES2038624-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES2039161-006	1200_MW113_201104	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3353189)									
ES2039161-002	1200_MW021_D_201104	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	66	66	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	66	66	0.00	0% - 20%
ES2039162-014	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	54	53	3.48	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	54	53	3.48	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3351155)									
ES2039161-001	1200_MW021_201104	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2039162-034	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	48	49	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3351154)									
ES2038982-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	15	13	13.4	0% - 50%
ES2039161-001	1200_MW021_201104	ED045G: Chloride	16887-00-6	1	mg/L	5	5	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3351156)									
ES2039162-034	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	273	271	0.729	0% - 20%
ES2039250-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	25	25	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3356045)									
ES2039161-001	1200_MW021_201104	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.00	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 (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3356045) - continued									
ES2039161-001	1200_MW021_201104	ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES2039162-014	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	8	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	6	5	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3353187)									
ES2039122-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES2039054-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.5	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3353190)									
ES2039161-002	1200_MW021_D_201104	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
ES2039162-014	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP002: Dissolved Organic Carbon (DOC) (QC Lot: 3359474)									
ES2039161-001	1200_MW021_201104	EP002: Dissolved Organic Carbon	----	1	mg/L	1	3	74.2	No Limit
ES2039162-014	Anonymous	EP002: Dissolved Organic Carbon	----	1	mg/L	2	4	65.7	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3353867)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	83.0	129
				<5	1000 mg/L	96.4	82.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3353189)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	104	81.0	111
				----	50 mg/L	123	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3351155)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	110	82.0	122
				<1	500 mg/L	98.7	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3351154)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	105	80.9	127
				<1	1000 mg/L	105	80.9	127
ED045G: Chloride by Discrete Analyser (QCLot: 3351156)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	103	80.9	127
				<1	1000 mg/L	102	80.9	127
ED093F: Dissolved Major Cations (QCLot: 3356045)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.4	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	85.0	113
EK040P: Fluoride by PC Titrator (QCLot: 3353187)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	95.6	82.0	116
EK040P: Fluoride by PC Titrator (QCLot: 3353190)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	99.4	82.0	116
EP002: Dissolved Organic Carbon (DOC) (QCLot: 3359474)								
EP002: Dissolved Organic Carbon	----	1	mg/L	<1	10 mg/L	105	71.0	121
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3353014)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.4	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	0.02	µg/L	<0.02	0.25 µg/L	97.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	87.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	91.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	96.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3353181)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3353181) - continued								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.4	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	0.02	µg/L	<0.02	0.25 µg/L	96.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	95.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	85.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3353014)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	76.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	85.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	77.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	80.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	92.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	83.7	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3353181)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	105	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	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	105	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	107	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	108	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	108	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3353014)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	100	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.4	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	83.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.7	57.6	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3353014) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	77.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3353181)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.2	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	116	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.3	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.8	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	100	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3353014)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	86.4	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	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	91.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3353181)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	80.0	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	116	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	107	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	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3351155)							
ES2039161-001	1200_MW021_201104	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	101	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3351154)							
ES2039161-001	1200_MW021_201104	ED045G: Chloride	16887-00-6	50 mg/L	95.2	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3351156)							
ES2039250-002	Anonymous	ED045G: Chloride	16887-00-6	50 mg/L	83.4	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3353187)							
ES2039054-005	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	73.4	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3353190)							
ES2039161-006	1200_MW113_201104	EK040P: Fluoride	16984-48-8	5 mg/L	94.8	70.0	130
EP002: Dissolved Organic Carbon (DOC) (QCLot: 3359474)							
ES2039161-002	1200_MW021_D_201104	EP002: Dissolved Organic Carbon	----	100 mg/L	119	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2039161**	Page	: 1 of 9
Amendment	: **2**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: [redacted]	Date Samples Received	: 06-Nov-2020
Site	: 1200_NT_PFASOMP	Issue Date	: 15-Jan-2021
Sampler	: [redacted]	No. of samples received	: 27
Order number	: 60612561 2.1	No. of samples analysed	: 27

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- **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	0	39	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	39	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
1200_MW021_201104, 1200_MW113_201104, 1200_MW004_D_201104, 1200_MW012_201104	1200_MW021_D_201104, 1200_MW112_201104, 1200_MW012_D_201104,	**04-Nov-2020**	**----**	----	----	**09-Nov-2020**	11-Nov-2020	✓
Clear Plastic Bottle - Natural (EA025H)								
1200_MW004_201105		**05-Nov-2020**	**----**	----	----	**09-Nov-2020**	12-Nov-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
1200_MW021_201104, 1200_MW113_201104, 1200_MW004_D_201104, 1200_MW012_201104	1200_MW021_D_201104, 1200_MW112_201104, 1200_MW012_D_201104,	**04-Nov-2020**	**----**	----	----	**09-Nov-2020**	18-Nov-2020	✓
Clear Plastic Bottle - Natural (ED037-P)								
1200_MW004_201105		**05-Nov-2020**	**----**	----	----	**09-Nov-2020**	19-Nov-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
1200_MW021_201104, 1200_MW113_201104, 1200_MW004_D_201104, 1200_MW012_201104	1200_MW021_D_201104, 1200_MW112_201104, 1200_MW012_D_201104,	**04-Nov-2020**	**----**	----	----	**07-Nov-2020**	02-Dec-2020	✓
Clear Plastic Bottle - Natural (ED041G)								
1200_MW004_201105		**05-Nov-2020**	**----**	----	----	**07-Nov-2020**	03-Dec-2020	✓

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
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
1200_MW021_201104, 1200_MW021_D_201104, 1200_MW113_201104, 1200_MW112_201104, 1200_MW004_D_201104, 1200_MW012_D_201104, 1200_MW012_201104	**04-Nov-2020**	**----**	----	----	**07-Nov-2020**	02-Dec-2020	✓
Clear Plastic Bottle - Natural (ED045G)							
1200_MW004_201105	**05-Nov-2020**	**----**	----	----	**07-Nov-2020**	03-Dec-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
1200_MW021_201104, 1200_MW021_D_201104, 1200_MW113_201104, 1200_MW112_201104, 1200_MW004_D_201104, 1200_MW012_D_201104, 1200_MW012_201104	**04-Nov-2020**	**----**	----	----	**10-Nov-2020**	11-Nov-2020	✓
Clear Plastic Bottle - Natural (ED093F)							
1200_MW004_201105	**05-Nov-2020**	**----**	----	----	**10-Nov-2020**	12-Nov-2020	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
1200_MW021_201104, 1200_MW021_D_201104, 1200_MW113_201104, 1200_MW112_201104, 1200_MW004_D_201104, 1200_MW012_D_201104, 1200_MW012_201104	**04-Nov-2020**	**----**	----	----	**09-Nov-2020**	02-Dec-2020	✓
Clear Plastic Bottle - Natural (EK040P)							
1200_MW004_201105	**05-Nov-2020**	**----**	----	----	**09-Nov-2020**	03-Dec-2020	✓
EP002: Dissolved Organic Carbon (DOC)							
Amber DOC Filtered- Sulfuric Preserved (EP002)							
1200_MW021_201104, 1200_MW021_D_201104, 1200_MW113_201104, 1200_MW112_201104, 1200_MW004_D_201104, 1200_MW012_D_201104, 1200_MW012_201104	**04-Nov-2020**	**----**	----	----	**12-Nov-2020**	02-Dec-2020	✓
Amber DOC Filtered- Sulfuric Preserved (EP002)							
1200_MW004_201105	**05-Nov-2020**	**----**	----	----	**12-Nov-2020**	03-Dec-2020	✓

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_QC500_201104,	1200_MW030_201104	**04-Nov-2020**	**10-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
HDPE (no PTFE) (EP231X)								
1200_MW021_201104,	1200_MW021_D_201104,	**04-Nov-2020**	**11-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
1200_MW031_201104,	1200_MW018_201104,							
1200_MW113-FF_201104,	1200_MW113_201104,							
1200_MW112-FF_201104,	1200_MW112_201104,							
1200_MW029_201104,	1200_MW004_D_201104,							
1200_MW012_D_201104,	1200_MW012_201104,							
1200_MW034_201104,	1200_MW066_201104,							
1200_QC100_201104,	1200_MW032_201104,							
1200_QC101_201104,	1200_QC400_201104,							
1200_QC300_201104								
HDPE (no PTFE) (EP231X)								
1200_MW004_201105,	1200_MW001_201105,	**05-Nov-2020**	**10-Nov-2020**	04-May-2021	✓	**11-Nov-2020**	04-May-2021	✓
1200_QC102_201105,	1200_QC301_201105,							
1200_QC401_201105,	1200_QC501_201105							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
1200_QC500_201104,	1200_MW030_201104	**04-Nov-2020**	**10-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
HDPE (no PTFE) (EP231X)								
1200_MW021_201104,	1200_MW021_D_201104,	**04-Nov-2020**	**11-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
1200_MW031_201104,	1200_MW018_201104,							
1200_MW113-FF_201104,	1200_MW113_201104,							
1200_MW112-FF_201104,	1200_MW112_201104,							
1200_MW029_201104,	1200_MW004_D_201104,							
1200_MW012_D_201104,	1200_MW012_201104,							
1200_MW034_201104,	1200_MW066_201104,							
1200_QC100_201104,	1200_MW032_201104,							
1200_QC101_201104,	1200_QC400_201104,							
1200_QC300_201104								
HDPE (no PTFE) (EP231X)								
1200_MW004_201105,	1200_MW001_201105,	**05-Nov-2020**	**10-Nov-2020**	04-May-2021	✓	**11-Nov-2020**	04-May-2021	✓
1200_QC102_201105,	1200_QC301_201105,							
1200_QC401_201105,	1200_QC501_201105							

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_QC500_201104,	1200_MW030_201104	**04-Nov-2020**	**10-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
HDPE (no PTFE) (EP231X)								
1200_MW021_201104,	1200_MW021_D_201104,	**04-Nov-2020**	**11-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
1200_MW031_201104,	1200_MW018_201104,							
1200_MW113-FF_201104,	1200_MW113_201104,							
1200_MW112-FF_201104,	1200_MW112_201104,							
1200_MW029_201104,	1200_MW004_D_201104,							
1200_MW012_D_201104,	1200_MW012_201104,							
1200_MW034_201104,	1200_MW066_201104,							
1200_QC100_201104,	1200_MW032_201104,							
1200_QC101_201104,	1200_QC400_201104,							
1200_QC300_201104								
HDPE (no PTFE) (EP231X)								
1200_MW004_201105,	1200_MW001_201105,	**05-Nov-2020**	**10-Nov-2020**	04-May-2021	✓	**11-Nov-2020**	04-May-2021	✓
1200_QC102_201105,	1200_QC301_201105,							
1200_QC401_201105,	1200_QC501_201105							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
1200_QC500_201104,	1200_MW030_201104	**04-Nov-2020**	**10-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
HDPE (no PTFE) (EP231X)								
1200_MW021_201104,	1200_MW021_D_201104,	**04-Nov-2020**	**11-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
1200_MW031_201104,	1200_MW018_201104,							
1200_MW113-FF_201104,	1200_MW113_201104,							
1200_MW112-FF_201104,	1200_MW112_201104,							
1200_MW029_201104,	1200_MW004_D_201104,							
1200_MW012_D_201104,	1200_MW012_201104,							
1200_MW034_201104,	1200_MW066_201104,							
1200_QC100_201104,	1200_MW032_201104,							
1200_QC101_201104,	1200_QC400_201104,							
1200_QC300_201104								
HDPE (no PTFE) (EP231X)								
1200_MW004_201105,	1200_MW001_201105,	**05-Nov-2020**	**10-Nov-2020**	04-May-2021	✓	**11-Nov-2020**	04-May-2021	✓
1200_QC102_201105,	1200_QC301_201105,							
1200_QC401_201105,	1200_QC501_201105							

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_QC500_201104, 1200_MW030_201104	**04-Nov-2020**	**10-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
HDPE (no PTFE) (EP231X)							
1200_MW021_201104, 1200_MW021_D_201104, 1200_MW031_201104, 1200_MW018_201104, 1200_MW113-FF_201104, 1200_MW113_201104, 1200_MW112-FF_201104, 1200_MW112_201104, 1200_MW029_201104, 1200_MW004_D_201104, 1200_MW012_D_201104, 1200_MW012_201104, 1200_MW034_201104, 1200_MW066_201104, 1200_QC100_201104, 1200_MW032_201104, 1200_QC101_201104, 1200_QC400_201104, 1200_QC300_201104	**04-Nov-2020**	**11-Nov-2020**	03-May-2021	✓	**11-Nov-2020**	03-May-2021	✓
HDPE (no PTFE) (EP231X)							
1200_MW004_201105, 1200_MW001_201105, 1200_QC102_201105, 1200_QC301_201105, 1200_QC401_201105, 1200_QC501_201105	**05-Nov-2020**	**10-Nov-2020**	04-May-2021	✓	**11-Nov-2020**	04-May-2021	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	39	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	39	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Dissolved Organic Carbon	EP002	WATER	In house: Referenced to APHA 5310 B. This method is compliant with NEPM Schedule B(3). Samples are combusted at high termperature in the presence of an oxidative catalyst. The evolved carbon dioxide is quantified using an IR detector.
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

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.

02-01.21

AECOM **1200 PAGE 1 of 1 Chain of Custody**

AECOM Australia Pty Ltd
[redacted]

Laboratory Details
Lab. Name: ALS
Lab. Address: 277-289 Woodpark Rd, Smithfield
Contact Name: [redacted]
Lab. Ref:
Tel: [redacted]
Fax:
Preliminary Report by:
Final Report by:
Lab Quote No: SY/139/19 v2

Sampled By: [redacted] **(ph:** **Project Name: NT_1200_PFASOMP** **AECOM Project #: 60612561** **Purchase Order No:**

Specifications: Please report in ESdat format	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr 5 days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: RE-FREEZE BIOTA SAMPLES)	
6. Report Format: ESdat 7. Project Manager:	

Lab. ID	Sample ID	Sampling Date	Matrix: biota	Matrix: water	Preservation: filt'ed	Preservation: acid	Preservation: ice	Preservation: frozen	Container (No. & type)	Analysis Request: PFAS Waters WATER	Analysis Request: Surface Waters WATER	HOLD	Notes
1	1200_SW091_201215	15/12/2020 14:14		X			X			X	X	x	
2	1200_SW123_201215	15/12/2020 14:30		X			X			X	X	x	
3	1200_SW086_201215	15/12/2020 14:50		X			X			X	X	x	
4	1200_SW075_201215	15/12/2020 15:10		X			X			X	X	x	
5	1200_QC300_201215	15/12/2020 0:00		X			X			X		x	LABELLED BY LOCATION NAME ONLY. NO SITE OR DATE USED IN SAMPLE BOTTLE NAMING CONVENTION. IN LAB REPORTS PLEASE USE WHAT IS ON THE COC. PLEASE INCORPORATE SAMPLING TIMES INTO THE REPORTS AND ESDAT FILES.
6	1200_QC400_201215	15/12/2020 0:00		X			X			X		x	
7	1200_QC500_201215	15/12/2020 0:00		X			X			X		x	

Comments: **Please send ESdat files to DERP.labreports@esdat.com.au and ensure that the files use the PROJECT NAME**

Temp. received: 10 15.8 °C

Report & invoice: [redacted]

Relinquished by: [redacted] Signed: [redacted] Date: 21/12/20

Received by: [redacted] Signed: [redacted] Date: 21/12/20

Relinquished by: Signed:

Received by: [redacted] Signed:

22.12.20
9am

Environmental Division Sydney
Work Order Reference
ES2045382

Telephone : +61-2-8784 8555

LAB OF ORIGIN: DARWIN

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2045382**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	: [redacted]m
Telephone	: ([redacted]	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: NT_1200_PFASOMP	Page	: 1 of 3
Order number	: 60612561	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	: 22-Dec-2020 09:00	Issue Date	: 22-Dec-2020
Client Requested Due Date	: 05-Jan-2021	Scheduled Reporting Date	: **05-Jan-2021**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 15.8' C
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **For sample #1, #2, #3, #4, ALS did not receive a green label plastic unpreserved bottle so any analysis that was due to come from this bottle will not be reported for this sample.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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 - EP002 Dissolved Organic Carbon (DOC)	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2045382-001	15-Dec-2020 14:14	1200_SW091_201215	✓	✓
ES2045382-002	15-Dec-2020 14:30	1200_SW123_201215	✓	✓
ES2045382-003	15-Dec-2020 14:50	1200_SW086_201215	✓	✓
ES2045382-004	15-Dec-2020 15:10	1200_SW075_201215	✓	✓
ES2045382-005	15-Dec-2020 00:00	1200_QC300_201215		✓
ES2045382-006	15-Dec-2020 00:00	1200_QC400_201215		✓
ES2045382-007	15-Dec-2020 00:00	1200_QC500_201215		✓

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]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *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	
- A4 - AU Tax Invoice (INV)	Email	
- Chain of Custody (CoC) (COC)	Email	
- EDI Format - ENMRG (ENMRG)	Email	
- EDI Format - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *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 - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *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 - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

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	
- *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 - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2045382**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: [redacted]	Date Samples Received	: 22-Dec-2020 09:00
Order number	: 60612561	Date Analysis Commenced	: 22-Dec-2020
C-O-C number	: ----	Issue Date	: 05-Jan-2021 12:12
Sampler	: [redacted]		
Site	: ----		
Quote number	: SY/139/19 V3		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
	Senior Spectroscopist	Sydney Inorganics, 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.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	1200_SW091_201215	1200_SW123_201215	1200_SW086_201215	1200_SW075_201215	1200_QC300_201215
			Sampling date / time	15-Dec-2020 14:14	15-Dec-2020 14:30	15-Dec-2020 14:50	15-Dec-2020 15:10	15-Dec-2020 00:00
Compound	CAS Number	LOR	Unit	ES2045382-001	ES2045382-002	ES2045382-003	ES2045382-004	ES2045382-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.58	6.02	5.83	5.91	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	24	34	14	24	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	12	10	6	8	----
Total Alkalinity as CaCO3	----	1	mg/L	12	10	6	8	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	4	3	3	5	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1	<1	<1	1	----
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	----
Sodium	7440-23-5	1	mg/L	4	4	2	3	----
Potassium	7440-09-7	1	mg/L	<1	11	<1	<1	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	0.35	0.28	0.20	0.30	----
ø Total Cations	----	0.01	meq/L	0.22	0.46	0.09	0.18	----
EP002: Dissolved Organic Carbon (DOC)								
Dissolved Organic Carbon	----	1	mg/L	<1	<1	<1	1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_SW091_201215	1200_SW123_201215	1200_SW086_201215	1200_SW075_201215	1200_QC300_201215
				Sampling date / time	15-Dec-2020 14:14	15-Dec-2020 14:30	15-Dec-2020 14:50	15-Dec-2020 15:10	15-Dec-2020 00:00
Compound	CAS Number	LOR	Unit		ES2045382-001	ES2045382-002	ES2045382-003	ES2045382-004	ES2045382-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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		**0.04**	**0.02**	<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
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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_SW091_201215	1200_SW123_201215	1200_SW086_201215	1200_SW075_201215	1200_QC300_201215
				Sampling date / time	15-Dec-2020 14:14	15-Dec-2020 14:30	15-Dec-2020 14:50	15-Dec-2020 15:10	15-Dec-2020 00:00
Compound	CAS Number	LOR	Unit		ES2045382-001	ES2045382-002	ES2045382-003	ES2045382-004	ES2045382-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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**	**0.02**	<0.01	**0.01**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	**0.02**	<0.01	**0.01**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.04**	**0.02**	<0.01	**0.01**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**106**	**104**	**101**	**109**
13C8-PFOA	----	0.02	%		**99.3**	**99.8**	**98.3**	**98.2**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC400_201215	1200_QC500_201215	----	----	----
				Sampling date / time	15-Dec-2020 00:00	15-Dec-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2045382-006	ES2045382-007	--------	--------	--------
					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	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
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_QC400_201215	1200_QC500_201215	----	----	----
				Sampling date / time	15-Dec-2020 00:00	15-Dec-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2045382-006	ES2045382-007	--------	--------	--------
					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	%		**104**	**106**	----	----	----
13C8-PFOA	----	0.02	%		**100**	**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	: **ES2045382**	Page	: 1 of 6
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	[redacted]	Address	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 22-Dec-2020
Order number	: [redacted]	Date Analysis Commenced	: 22-Dec-2020
C-O-C number	: ----	Issue Date	: 05-Jan-2021
Sampler	: [redacted]		
Site	: ----		
Quote number	: SY/139/19 V3		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
	Senior Spectroscopist	Sydney Inorganics, 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

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 (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3436708)									
ES2045273-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.96	7.96	0.00	0% - 20%
ES2044937-007	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.21	8.20	0.122	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3436977)									
ES2045380-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	28200	29100	3.04	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3436978)									
ES2045380-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	44	60	31.9	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3436709)									
ES2045273-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	8760	8800	0.471	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	8760	8800	0.471	0% - 20%
ES2044937-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	6440	6500	1.02	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	6440	6500	0.978	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3439486)									
ES2044940-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2045381-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3439487)									
ES2044940-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1	2	0.00	No Limit
ES2045381-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	7	8	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3443332)									
ES2045380-008	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3443332) - continued									
ES2045380-008	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES2045406-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3436710)									
ES2045273-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.2	1.1	0.00	0% - 50%
ES2044937-007	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.9	0.9	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3436711)									
ES2045414-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	3.4	3.6	4.28	0% - 20%
ES2045424-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.00	No Limit
EP002: Dissolved Organic Carbon (DOC) (QC Lot: 3441245)									
ES2044940-004	Anonymous	EP002: Dissolved Organic Carbon	----	1	mg/L	4	4	0.00	No Limit
ES2045382-002	1200_SW123_201215	EP002: Dissolved Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3436708)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.8	101
				----	7 pH Unit	100	99.2	101
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3436977)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	95.6	87.0	109
				<10	293 mg/L	106	66.0	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3436978)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	102	83.0	129
				<5	1000 mg/L	96.2	82.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3436709)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	110	81.0	111
				----	50 mg/L	120	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3439486)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.1	82.0	122
				<1	500 mg/L	93.5	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3439487)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	107	80.9	127
				<1	1000 mg/L	104	80.9	127
ED093F: Dissolved Major Cations (QCLot: 3443332)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.9	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.2	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.4	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.0	85.0	113
EK040P: Fluoride by PC Titrator (QCLot: 3436710)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	106	82.0	116
EK040P: Fluoride by PC Titrator (QCLot: 3436711)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	98.6	82.0	116
EP002: Dissolved Organic Carbon (DOC) (QCLot: 3441245)								
EP002: Dissolved Organic Carbon	----	1	mg/L	<1	10 mg/L	93.4	71.0	121
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3441855)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	96.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	93.8	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3441855) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	92.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	89.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3441855)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	116	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	105	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	113	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	105	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	109	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3441855)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	71.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	84.1	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	80.2	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	84.7	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	91.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3441855)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	103	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	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	94.0	71.4	144

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3439486)							
ES2044940-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	120	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3439487)							
ES2044940-004	Anonymous	ED045G: Chloride	16887-00-6	50 mg/L	106	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3436710)							
ES2044940-004	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	105	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3436711)							
ES2045382-002	1200_SW123_201215	EK040P: Fluoride	16984-48-8	5 mg/L	93.2	70.0	130
EP002: Dissolved Organic Carbon (DOC) (QCLot: 3441245)							
ES2044940-005	Anonymous	EP002: Dissolved Organic Carbon	----	100 mg/L	104	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2045382**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 22-Dec-2020
Site	: ----	Issue Date	: 05-Jan-2021
Sampler	: [redacted]	No. of samples received	: 7
Order number	: 60612561	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	----	----	----	22-Dec-2020	15-Dec-2020	**7**
ED093F: Dissolved Major Cations						
Clear Plastic Bottle - Natural						
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	----	----	----	30-Dec-2020	22-Dec-2020	**8**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓

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
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**24-Dec-2020**	12-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**24-Dec-2020**	12-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	22-Dec-2020	×
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	12-Jan-2021	✓
EP002: Dissolved Organic Carbon (DOC)							
Amber DOC Filtered- Sulfuric Preserved (EP002)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215	**15-Dec-2020**	**----**	----	----	**26-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215, 1200_QC300_201215, 1200_QC400_201215, 1200_QC500_201215	**15-Dec-2020**	**29-Dec-2020**	13-Jun-2021	✓	**30-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215, 1200_QC300_201215, 1200_QC400_201215, 1200_QC500_201215	**15-Dec-2020**	**29-Dec-2020**	13-Jun-2021	✓	**30-Dec-2020**	13-Jun-2021	✓

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_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215, 1200_QC300_201215, 1200_QC400_201215, 1200_QC500_201215	**15-Dec-2020**	**29-Dec-2020**	13-Jun-2021	✓	**30-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215, 1200_QC300_201215, 1200_QC400_201215, 1200_QC500_201215	**15-Dec-2020**	**29-Dec-2020**	13-Jun-2021	✓	**30-Dec-2020**	13-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_SW091_201215, 1200_SW123_201215, 1200_SW086_201215, 1200_SW075_201215, 1200_QC300_201215, 1200_QC400_201215, 1200_QC500_201215	**15-Dec-2020**	**29-Dec-2020**	13-Jun-2021	✓	**30-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Dissolved Organic Carbon	EP002	WATER	In house: Referenced to APHA 5310 B. This method is compliant with NEPM Schedule B(3). Samples are combusted at high termperature in the presence of an oxidative catalyst. The evolved carbon dioxide is quantified using an IR detector.

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.

06.01.21

CHAIN OF CUSTODY

ALS COC#: 17318 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
[redacted]	[redacted]		[redacted]
DATE TIME: 22/12/20 10am	DATE TIME: 22/12/20	DATE TIME:	DATE TIME: 23/12/20 7:30am

12.8°C

CLIENT: AECOMAU - AECOM Australia Pty Ltd

PROJECT: NT_1200_PFASOMP

SITE: Robertson

ORDER NO: 60612561

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

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: 1.0 13.1 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Waters WATER	Surface Waters - Fresh WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	1200_SW001_201221	Extra for lab QC	21/12/2020 01:06 PM	Water	ALS: 3 Non ALS: 0	No	X			
002	1200_SW007_201221	Extra for QC	21/12/2020 01:31 PM	Water	ALS: 7 Non ALS: 0	No		X		
003	1200_QC100_201221		21/12/2020 01:38 PM	Water	ALS: 6 Non ALS: 0	No		X		
004	1200_QC200_201221	Please forward to NMI	21/12/2020 01:39 PM	Water	ALS: 5 Non ALS: 0	No		X		
005	1200_SW059_201221		21/12/2020 02:12 PM	Water	ALS: 3 Non ALS: 0	No	X			
006	1200_QC300_201221		21/12/2020 02:33 PM	Water	ALS: 2 Non ALS: 0	No	X			
007	1200_QC400_201221		21/12/2020 02:33 PM	Water	ALS: 2 Non ALS: 0	No	X			
008	1200_QC500_201221		21/12/2020 02:34 PM	Water	ALS: 2 Non ALS: 0	No	X			

Environmental Division Sydney

Work Order Reference

ES2045525

Telephone : +61-2-8784 8555

LAB OF ORIGIN DARWIN

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2045525**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: NT_1200_PFASOMP	Page	: 1 of 3
Order number	: 60612561	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: 17318	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Robertson		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Dec-2020 07:30	Issue Date	: 24-Dec-2020
Client Requested Due Date	: 06-Jan-2021	Scheduled Reporting Date	: **06-Jan-2021**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 13.1' C
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample 1200_QC200_201221 forwarded to NMI as per COC.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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.

ES2045525-001 : 21-Dec-2020 13:06 : 1200_SW001_201221 - Extra for lab QC
ES2045525-002 : 21-Dec-2020 13:31 : 1200_SW007_201221 - Extra for 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 - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP002 Dissolved Organic Carbon (DOC)	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02A Ca, Mg, Na, K, Cl, SO4, Alkalinity & Fluoride
ES2045525-001	21-Dec-2020 13:06	1200_SW001_201221 E...						✓	
ES2045525-002	21-Dec-2020 13:31	1200_SW007_201221 E...	✓	✓	✓	✓	✓	✓	✓
ES2045525-003	21-Dec-2020 13:38	1200_QC100_201221	✓	✓	✓	✓	✓	✓	✓
ES2045525-005	21-Dec-2020 14:12	1200_SW059_201221						✓	
ES2045525-006	21-Dec-2020 14:33	1200_QC300_201221						✓	
ES2045525-007	21-Dec-2020 14:33	1200_QC400_201221						✓	
ES2045525-008	21-Dec-2020 14:34	1200_QC500_201221						✓	

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

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

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
1200_QC100_20122	Clear Plastic Bottle - Natural	----	21-Dec-2020	23-Dec-2020	×	----	----
1200_SW007_20122	Clear Plastic Bottle - Natural	----	21-Dec-2020	23-Dec-2020	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV) — Email — [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 - ENMRG (ENMRG) — 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 - ENMRG (ENMRG) — Email
- EDI Format - ESDAT (ESDAT) — Email
- EDI Format - XTab (XTAB) — Email

[redacted]

- EDI Format - ESDAT (ESDAT) — Email — [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 - ENMRG (ENMRG) — 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 - ENMRG (ENMRG) — Email
- EDI Format - ESDAT (ESDAT) — Email
- EDI Format - XTab (XTAB) — Email

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2045525**	Page	: 1 of 11
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	: 23-Dec-2020 07:30
Order number	: 60612561	Date Analysis Commenced	: 23-Dec-2020
C-O-C number	: 17318	Issue Date	: 05-Jan-2021 11:31
Sampler	: [redacted]		
Site	: Robertson		
Quote number	: SY/139/19 V3		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
	Analyst	Sydney Inorganics, 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.
- TDS by method EA-015 may bias high for sample 3 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- ED037: Poor duplicate precision for Alkalinity. However, insufficient sample has been provided for confirmation analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_QC100_201221	----	----	----	----
				Sampling date / time	21-Dec-2020 13:38	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2045525-003	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**5.85**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**23**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**146**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**7**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**7**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**5**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**2**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	----	----	----	----
Sodium	7440-23-5	1	mg/L		**3**	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.28**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**0.23**	----	----	----	----
EP002: Dissolved Organic Carbon (DOC)									
Dissolved Organic Carbon	----	1	mg/L		**4**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_QC100_201221	----	----	----	----
				Sampling date / time	21-Dec-2020 13:38	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2045525-003	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	1200_QC100_201221	----	----	----	----
				Sampling date / time	21-Dec-2020 13:38	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2045525-003	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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	%		**114**	----	----	----	----
13C8-PFOA	----	0.02	%		**106**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	1200_SW001_201221 Extra for lab QC	1200_SW007_201221 Extra for QC	1200_SW059_201221	1200_QC300_201221	1200_QC400_201221
			Sampling date / time	21-Dec-2020 13:06	21-Dec-2020 13:31	21-Dec-2020 14:12	21-Dec-2020 14:33	21-Dec-2020 14:33
Compound	CAS Number	LOR	Unit	ES2045525-001	ES2045525-002	ES2045525-005	ES2045525-006	ES2045525-007
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	6.18	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	20	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	15	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	10	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	10	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	<1	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	4	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	2	----	----	----
Magnesium	7439-95-4	1	mg/L	----	<1	----	----	----
Sodium	7440-23-5	1	mg/L	----	3	----	----	----
Potassium	7440-09-7	1	mg/L	----	<1	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	----	<0.1	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	0.31	----	----	----
ø Total Cations	----	0.01	meq/L	----	0.23	----	----	----
EP002: Dissolved Organic Carbon (DOC)								
Dissolved Organic Carbon	----	1	mg/L	----	3	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_SW001_201221 Extra for lab QC	1200_SW007_201221 Extra for QC	1200_SW059_201221	1200_QC300_201221	1200_QC400_201221
				Sampling date / time	21-Dec-2020 13:06	21-Dec-2020 13:31	21-Dec-2020 14:12	21-Dec-2020 14:33	21-Dec-2020 14:33
					ES2045525-001	ES2045525-002	ES2045525-005	ES2045525-006	ES2045525-007
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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
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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_SW001_201221 Extra for lab QC	1200_SW007_201221 Extra for QC	1200_SW059_201221	1200_QC300_201221	1200_QC400_201221
				Sampling date / time	21-Dec-2020 13:06	21-Dec-2020 13:31	21-Dec-2020 14:12	21-Dec-2020 14:33	21-Dec-2020 14:33
Compound	CAS Number	LOR	Unit		ES2045525-001	ES2045525-002	ES2045525-005	ES2045525-006	ES2045525-007
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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	%		**113**	**110**	**106**	**120**	**104**
13C8-PFOA	----	0.02	%		**107**	**106**	**102**	**104**	**97.9**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC500_201221	----	----	----	----
				Sampling date / time	21-Dec-2020 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2045525-008	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
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_QC500_201221	----	----	----	----
				Sampling date / time	21-Dec-2020 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2045525-008	--------	--------	--------	--------
					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	%		**102**	----	----	----	----
13C8-PFOA	----	0.02	%		**90.3**	----	----	----	----

Surrogate Control Limits

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

Sub-Matrix: **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	: **ES2045525**	Page	: 1 of 9
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	: 23-Dec-2020
Order number	: 60612561	Date Analysis Commenced	: 23-Dec-2020
C-O-C number	: 17318	Issue Date	: 05-Jan-2021
Sampler	: [redacted]		
Site	: Robertson		
Quote number	: SY/139/19 V3		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
	Analyst	Sydney Inorganics, 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

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 (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3440896)									
ES2045558-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.70	6.66	0.599	0% - 20%
ES2045848-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.12	6.12	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3439096)									
ES2044940-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43	41	4.79	No Limit
ES2045547-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	87	71	20.5	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3439097)									
ES2044940-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	42	46	9.63	No Limit
ES2045547-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	6	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3440895)									
ES2045558-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	62	# 81	26.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	62	# 81	26.4	0% - 20%
ES2045848-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	19	20	7.60	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	19	20	7.60	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3439791)									
ES2045524-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2045857-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	198	201	1.19	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3443189)									
ES2045525-003	1200_QC100_201221	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2045932-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3439792)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3439792) - continued									
ES2045524-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1	1	0.00	No Limit
ES2045857-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	105	104	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3443190)									
ES2045525-003	1200_QC100_201221	ED045G: Chloride	16887-00-6	1	mg/L	5	4	0.00	No Limit
ES2045932-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	15	15	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3444358)									
ES2045525-002	1200_SW007_201221 Extra for QC	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES2045558-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	10	10	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3440894)									
ES2045558-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
ES2045848-005	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP002: Dissolved Organic Carbon (DOC) (QC Lot: 3441245)									
ES2044940-004	Anonymous	EP002: Dissolved Organic Carbon	----	1	mg/L	4	4	0.00	No Limit
ES2045382-002	Anonymous	EP002: Dissolved Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3442269)									
ES2045525-001	1200_SW001_201221 Extra for lab QC	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2045525-003	1200_QC100_201221	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3442269)									
ES2045525-001	1200_SW001_201221 Extra for lab QC	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3442269) - continued									
ES2045525-001	1200_SW001_201221 Extra for lab QC	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES2045525-003	1200_QC100_201221	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3442269)									
ES2045525-001	1200_SW001_201221 Extra for lab QC	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2045525-003	1200_QC100_201221	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3442269) - continued									
ES2045525-003	1200_QC100_201221	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3442269)									
ES2045525-001	1200_SW001_201221 Extra for lab QC	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2045525-003	1200_QC100_201221	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3442269)									
ES2045525-001	1200_SW001_201221 Extra for lab QC	EP231X: Sum of PFAS	----	0.01	µg/L	0.03	0.03	0.00	No Limit
ES2045525-003	1200_QC100_201221	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3440896)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.0	98.8	101
				----	7 pH Unit	99.6	99.2	101
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3439096)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	87.0	109
				<10	293 mg/L	100	66.0	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3439097)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	113	83.0	129
				<5	1000 mg/L	92.2	82.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3440895)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.9	81.0	111
				----	50 mg/L	118	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3439791)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.7	82.0	122
				<1	500 mg/L	95.8	82.0	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3443189)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82.0	122
				<1	500 mg/L	102	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3439792)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	96.6	80.9	127
				<1	1000 mg/L	92.5	80.9	127
ED045G: Chloride by Discrete Analyser (QCLot: 3443190)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	114	80.9	127
				<1	1000 mg/L	104	80.9	127
ED093F: Dissolved Major Cations (QCLot: 3444358)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.4	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.7	85.0	113
EK040P: Fluoride by PC Titrator (QCLot: 3440894)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	107	82.0	116
EP002: Dissolved Organic Carbon (DOC) (QCLot: 3441245)								
EP002: Dissolved Organic Carbon	----	1	mg/L	<1	10 mg/L	93.4	71.0	121
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3442269)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3442269) - continued								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	99.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	95.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3442269)								
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	76.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	100	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	94.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	107	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3442269)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	104	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	116	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	128	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	123	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: 3442269)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	105	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	119	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	118	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	77.0	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(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3439791)							
ES2045524-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	121	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3443189)							
ES2045525-003	1200_QC100_201221	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	118	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3439792)							
ES2045524-001	Anonymous	ED045G: Chloride	16887-00-6	50 mg/L	90.6	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3443190)							
ES2045525-003	1200_QC100_201221	ED045G: Chloride	16887-00-6	50 mg/L	109	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3440894)							
ES2045525-002	1200_SW007_201221 Extra for QC	EK040P: Fluoride	16984-48-8	5 mg/L	95.0	70.0	130
EP002: Dissolved Organic Carbon (DOC) (QCLot: 3441245)							
ES2044940-005	Anonymous	EP002: Dissolved Organic Carbon	----	100 mg/L	104	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3442269)							
ES2045525-005	1200_SW059_201221	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	87.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	81.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	78.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	79.4	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	88.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3442269)							
ES2045525-005	1200_SW059_201221	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	76.7	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	88.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	82.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	82.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	82.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	88.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	96.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	91.8	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	96.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	84.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3442269)							
ES2045525-005	1200_SW059_201221	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	93.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	85.3	68.0	141

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3442269) - continued							
ES2045525-005	1200_SW059_201221	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	80.6	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	79.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	86.0	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	99.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3442269)							
ES2045525-005	1200_SW059_201221	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	79.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	90.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	79.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	119	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2045525**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: [redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 23-Dec-2020
Site	: Robertson	Issue Date	: 05-Jan-2021
Sampler	: [redacted]	No. of samples received	: 7
Order number	: 60612561	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED037P: Alkalinity by PC Titrator	ES2045558--001	Anonymous	**Bicarbonate Alkalinity as CaCO3**	71-52-3	26.4 %	0% - 20%	**RPD exceeds LOR based limits**
ED037P: Alkalinity by PC Titrator	ES2045558--001	Anonymous	**Total Alkalinity as CaCO3**	----	26.4 %	0% - 20%	**RPD exceeds LOR based limits**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	----	----	----	24-Dec-2020	21-Dec-2020	**3**
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	----	----	----	30-Dec-2020	28-Dec-2020	**2**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**24-Dec-2020**	21-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**23-Dec-2020**	28-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**23-Dec-2020**	28-Dec-2020	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**24-Dec-2020**	04-Jan-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
1200_SW007_201221 - Extra for QC		**21-Dec-2020**	**----**	----	----	**24-Dec-2020**	18-Jan-2021	✓
Clear Plastic Bottle - Natural (ED041G)								
1200_QC100_201221		**21-Dec-2020**	**----**	----	----	**29-Dec-2020**	18-Jan-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
1200_SW007_201221 - Extra for QC		**21-Dec-2020**	**----**	----	----	**24-Dec-2020**	18-Jan-2021	✓
Clear Plastic Bottle - Natural (ED045G)								
1200_QC100_201221		**21-Dec-2020**	**----**	----	----	**29-Dec-2020**	18-Jan-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**30-Dec-2020**	28-Dec-2020	×
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**24-Dec-2020**	18-Jan-2021	✓
EP002: Dissolved Organic Carbon (DOC)								
Amber DOC Filtered- Sulfuric Preserved (EP002)								
1200_SW007_201221 - Extra for QC,	1200_QC100_201221	**21-Dec-2020**	**----**	----	----	**26-Dec-2020**	18-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
1200_SW001_201221 - Extra for lab QC, 1200_QC100_201221, 1200_QC300_201221, 1200_QC500_201221	1200_SW007_201221 - Extra for QC, 1200_SW059_201221, 1200_QC400_201221,	**21-Dec-2020**	**30-Dec-2020**	19-Jun-2021	✓	**30-Dec-2020**	19-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
1200_SW001_201221 - Extra for lab QC, 1200_QC100_201221, 1200_QC300_201221, 1200_QC500_201221	1200_SW007_201221 - Extra for QC, 1200_SW059_201221, 1200_QC400_201221,	**21-Dec-2020**	**30-Dec-2020**	19-Jun-2021	✓	**30-Dec-2020**	19-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
1200_SW001_201221 - Extra for lab QC, 1200_QC100_201221, 1200_QC300_201221, 1200_QC500_201221	1200_SW007_201221 - Extra for QC, 1200_SW059_201221, 1200_QC400_201221,	**21-Dec-2020**	**30-Dec-2020**	19-Jun-2021	✓	**30-Dec-2020**	19-Jun-2021	✓

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_SW001_201221 - Extra for lab QC, 1200_QC100_201221, 1200_QC300_201221, 1200_QC500_201221, 1200_SW007_201221 - Extra for QC, 1200_SW059_201221, 1200_QC400_201221,	**21-Dec-2020**	**30-Dec-2020**	19-Jun-2021	✓	**30-Dec-2020**	19-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
1200_SW001_201221 - Extra for lab QC, 1200_QC100_201221, 1200_QC300_201221, 1200_QC500_201221, 1200_SW007_201221 - Extra for QC, 1200_SW059_201221, 1200_QC400_201221,	**21-Dec-2020**	**30-Dec-2020**	19-Jun-2021	✓	**30-Dec-2020**	19-Jun-2021	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Organic Carbon	EP002	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**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
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Dissolved Organic Carbon	EP002	WATER	In house: Referenced to APHA 5310 B. This method is compliant with NEPM Schedule B(3). Samples are combusted at high termperature in the presence of an oxidative catalyst. The evolved carbon dioxide is quantified using an IR detector.

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

Department of Defence
Directorate of PFAS Remediation
Environment and Engineering Branch
27-September--2021

Sampling Event Factual Report, April 2021

PFAS OMP - Robertson Barracks

Sampling Event Factual Report, April 2021

PFAS OMP - Robertson Barracks

Client: Department of Defence

ABN: 68706814312

Prepared by

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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, 2018) 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, 2018) 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.

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 April 2021 groundwater, surface water and sediment sampling event, conducted in accordance with the Sampling and Analysis Quality Plan (SAQP) (AECOM, 2019).

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, 2019).

Prior to commencement of the sampling events, the SAQP 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) Measure 1999 (ASC NEPM)
- Defence Routine Environment Water Quality Monitoring Manual (Department of Defence, 2019)
- AS/NZ 5667:1998 Water quality – Sampling (AS/NZS, 1998)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2018); and
- Relevant Territory regulatory guidelines.

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

- Collection of 18 groundwater samples (including gauging of groundwater levels) from existing monitoring wells using Hydrasleeves™ (refer to **Table 1** below, and **Figure 2** in **Appendix A**, for specific locations).
- Collection of 7 surface water samples from 7 of the 9 planned sampling locations (refer to **Table 2** below, and **Figure 2** in **Appendix A** for specific locations). Two locations were dry and surface water samples were therefore unable to be collected from those locations during this sampling event.
- Collection of sediment samples from 9 of the 9 planned sampling locations (refer to **Table** 3 below, and **Figure 3** 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 Sampling Analysis and Quality Plan (SAQP) for the OMP groundwater, surface water and sediment sampling events 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	

Area	Description	Sampling Locations	Number of wells/ bores	Total
	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	
	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	

Table 2 Surface water sampling locations

Area	Description	Sampling Locations	Number of Locations	Total
On Site	On-base drainage line, South east boundary	SW001	1	5
	On-base drainage line, South west boundary	SW007	1	
	On-base drainage line, Central	SW023*, SW028*	2	
	On-base drainage line, Eastern boundary	SW059	1	
Off Site	Northern Drainage Line	SW123	1	4
	Milner's Creek	SW086, SW091	2	
	Southern Drainage Channel	SW075	1	

*Location not sampled. Refer to **Table 4** and **Table 10** for further details

Table 3 Sediment sampling locations

Area	Description	Sampling Locations	Number of Locations	Total
On Site	On-base drainage line, South east boundary	SD001	1	5
	On-base drainage line, South west boundary	SD007	1	
	On-base drainage line, Central	SD023, SD028	2	
	On-base drainage line, Eastern boundary	SD059	1	
Off Site	Northern Drainage Line	SD123	1	4
	Milner's Creek	SD086, SD091	2	

Area	Description	Sampling Locations	Number of Locations	Total
	Southern Drainage Channel	SD075	1	

2.2 Deviations from the SAQP

The works completed during this sampling even included some deviations from the SAQP (AECOM, 2019) as outlined in **Table 4** below.

Table 4 Deviations from the SAQP during sampling event for April 2021

SAQP	April 2021 Sampling Event
Nine surface water (on-base) locations are identified to be sampled as part of the start of the sampling event.	Monitoring locations SW028 and SW023 were dry and were not sampled.
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 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. The change to the sampling methodology is not considered to have a material impact on the monitoring results or interpretation.
Sampling of groundwater and surface water for the non-PFAS suite in February 2021	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”.

3.0 Sampling methodology

The methodology adopted for the annual sediment sampling and biannual groundwater and surface water sampling event in April 2021 was in general accordance with the SAQP (noting that changes/deviations are captured in **Section 2.2**) and is summarised below:

Table 5 Sampling methodology

Item	Details
Groundwater, surface water and sediment sampling methodology	
Groundwater gauging	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 were 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

Item	Details
	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 then redeployed within the screened interval in preparation for the next sampling round. 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 and 0.1 m bgl. 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 C** 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 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) (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, surface water and sediment

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	
Industrial/Commercial - Sediment	PFOS + PFHxS	20 mg/kg	Adopted sediment criteria are sourced from the PFAS NEMP for consistency with those adopted for previous monitoring and to provide some context for the magnitude of reported sediment concentrations. *All sediment results will be compared to the Public Open Space criteria.*
	PFOA	50 mg/kg	
Public open space - sediment	PFOS + PFHxS	1 mg/kg	
	PFOA	10 mg/kg	
Residential accessible soil - sediment	PFOS + PFHxS	0.009 mg/kg	
	PFOA	0.1 mg/kg	
Residential minimal soil access	PFOS + PFHxS	2 mg/kg	
	PFOA	20 mg/kg	
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, 2020).

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

Key findings from the data validation were as follows:

Groundwater

- Elevated RPDs should be taken into consideration when using data for Sum of PFAS quantitatively.

- Elevated RPDs should be taken into consideration when using data for PFOS Sum of PFHxS + PFOS where close to the guidelines.
    - Monitoring wells MW032 and MW034 had Sum of PFHxS and PFOS concentrations close to the guideline of 0.07 µg/L, however, these results are within the expected Sum of PFHxS and PFOS concentration ranges for these locations.

Surface Water

- The surface water analytical results can be used as a basis for interpretation.

Sediment

- The sediment analytical data can be used as a basis for interpretation.

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) (Defence, 2018 as amended 2019) Annex L requirements.

4.0 Field observations and results

4.1 General field observations

The following field observations were applicable across the entirety of the April 2021 sampling event.

Table 7 General field observations

Item	Observation
Weather conditions	Weather in general was observed to be partly cloudy, 26-33 °C and moderately humid during the sampling event. No rainfall was recorded at the nearest rain gauging station (Darwin airport) on 15 April and 0.8 mm was recorded on 16 April. (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 8 Groundwater observations and field measurements

Item	Observations and field measurements
Fieldwork Dates	The groundwater sampling was completed between 15 and 16 April 2021.
Access and Sample Collection	All monitoring wells and bores were accessible and able to be sampled.
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 wells MW080, MW004 and MW031. High turbidity was observed in samples collected from monitoring locations MW004, MW001, MW029 and MW031. HydraSleeves™ collected from monitoring locations MW066, MW032 and MW029 contained red sediment and sediment build-up was observed at the bottoms of the wells during depth to bottom measurements.
Depth to Groundwater and flow direction	Depth to groundwater was recorded from 16 of 18 wells visited, ranging from 0.08 (MW030) to 5.66 (MW023) metres below top of casing (m btoc). Groundwater elevations in the shallow aquifer, where calculated were between 15.10 (MW021) and 27.24 (MW012) metres Australian Height Datum (m AHD). Groundwater gauging data is presented in **Table T1** in **Appendix B**. Inferred groundwater contours and groundwater flow directions at the site in April 2020 are shown on **Figure 4** in **Appendix B**. 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™ using a decontaminated YSI cup and YSI Pro Water Quality Meter. The readings are presented in **Table T1** in **Appendix B**, and are summarised below: • DO ranged from 0.14 mg/L (MW004) to 2.13 mg/L (MW112). • EC ranged from 29.1 µS/cm (MW032) to 814 µS/cm (MW004) indicating a relatively low salinity. • pH ranged from 5.1 (MW066) to 6.88 (MW112) indicating slightly acidic conditions. • ORP (corrected) ranged from 44.6 mV (MW004) to 418.3 mV (MW066) 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, each of the 18 groundwater locations sampled reported concentrations of PFAS above the laboratory limits of reporting (LOR). Monitoring location MW080 recorded a first-time exceedance of the NEMP (2020) Drinking Water criteria for sum of PFHxS+PFOS.

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

The PFAS groundwater analytical results from the April 2021 sampling event are presented below (**Table 9**), in **Table T2** in **Appendix B** and spatially on **Figure 5** in **Appendix A.**

Table 9 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)	
		April 2021	Historical maximum	April 2021	Historical maximum	April 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).	MW080	0.12µg/L	0.05µg/L	<0.01µg/L	<0.01µg/L	0.08µg/L	0.03µg/L
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.						

4.3 Surface water

4.3.1 Field observations and field measurements

Table 10 Surface water observations and field measurements

Compound	Criteria
Fieldwork Dates	Surface water sampling was completed on 15 April 2021.
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.
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 stagnant 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 2021. The stabilised readings are presented in **Table T3** in **Appendix B**, and are summarised below: • Dissolved oxygen ranged from 3.64 (SW123) to 6.8 mg/L (SW007) indicating fair to well oxygenated conditions. • Electrical conductivity ranged from 19.1 µS/cm (SW123) to 55.8 µS/cm (SW001) indicating freshwater conditions. Calculated Total Dissolved Solids (TDS) ranged from 12.4 mg/L to 36.3 mg/L from SW001 and SW123, respectively. • pH ranged from 5.3 (SW086) to 7.9 (SW091) indicating slightly acidic to neutral conditions. • Redox ranged from 70.1mV (SW091) to 208.8mV (SW007) indicating oxidising conditions. Corrected redox values range between 270.1mV and 408.8mV at SW091 and SW007, respectively. 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.

4.3.2 PFAS surface water analytical results

During this sampling event, monitoring location SW086 recorded a first-time detection of the NEMP (2020) Drinking Water criteria for sum of PFHxS+PFOS. There were no other first-time exceedances at any of the other 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 April 2021 sampling event are presented below (**Table 11**), **Table T4** in **Appendix B** and spatially on **Figure 6** in **Appendix A**.

Table 11 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)	
		April 2021	Historical maximum	April 2021	Historical maximum	April 2021	Historical maximum
First time detections of Sum of PFHxS+PFOS, PFOS or PFOA in surface water (shaded blue).	SW086	0.01 µg/L	< 0.01µg/L	<0.01µg/L	<0.01µg/L	0.01µg/L	<0.01µg/L
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).	SW086	0.01 µg/L	< 0.01µg/L	<0.01µg/L	<0.01µg/L	0.01µg/L	<0.01µg/L

4.4 Sediment

4.4.1 Field observations and field measurements

Compound	Criteria
Fieldwork Dates	Sediment sampling was completed on 15 and 16 April 2021.
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 T5** in **Appendix B**, and are summarised below: • Sediment colour ranged from greys to browns • Sediment matrix consisted mostly of sand with gravels • Sediment was generally odourless; however, an organic odour was noted at SD007 and SD123. • Characteristics were not noted for SD091 and SD007.

4.4.2 PFAS sediment analytical results

The PFAS sediment analytical results from the April 2021 sampling event are presented below (**Table 12**) and in **Table T6** in **Appendix B**. There were no first-time detections above the limit of reporting or screening criteria in the dataset.

Table 12 First Time Detections of PFAS and Exceedances of Guidelines in Sediment

Type	Location ID	Sum of PFHxS + PFOS concentration (mg/kg)		PFOA concentration (mg/kg)		PFOS concentration (mg/kg)	
		April 2021	Historical maximum	April 2021	Historical maximum	April 2021	Historical maximum
First time detections of Sum of PFHxS+PFOS, PFOS or PFOA in sediment.	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 sediment.	There were no first-time exceedances of PFHxS+PFOS, PFOS or PFOA during this sampling event, when compared to the following guidance criteria: PFAS NEMP (2020) Human Health Public Open Space.						

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 15 and 16 April 2021. The program included sampling of:

- Groundwater sampled from 18 of a planned 18 monitoring wells
- Surface water sampled from 7 of a planned 9 locations
- Sediment sampled from 9 of a planned 9 locations.

The findings of the April 2021 sampling events and the recommended actions are summarised in **Table 14** below.

Table 13 Summary of Sampling Event

Item	Comment	Recommended Actions
Access to sampling locations	Groundwater monitoring well MW023 was sampled for the first time since before November 2017. Monitoring well MW023 was dry during previous events.	While MW023 was sampled during the April 2021 sampling event, an alternative location should be identified as a contingency well to ensure a downgradient well is sampled each sampling round.
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.	AECOM will replace the flush mount cover during the next OMP related visit.
Analytical Results	PFAS concentrations were recorded above the LOR at 7 of 18 monitoring wells, 6 of 9 surface water locations sampled, and 2 of 9 sediment locations sampled.	No actions recommended. Ongoing monitoring in accordance with the OMP.
First time exceedance of NEMP drinking water guideline values in groundwater	Groundwater monitoring location MW080 recorded a first-time exceedance of the NEMP drinking water guideline for Sum of PFHxS + PFOS during the April 2021 sampling event.	Monitoring location MW080 is located adjacent to source areas 02 and 03 and a new exceedance in this location does not currently suggest a change in the conceptual site model. No further action is recommended at this time. 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 April 2021 sampling event.	No actions recommended. Ongoing monitoring in accordance with the OMP.

Item	Comment	Recommended Actions
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 April 2021 sampling event.	No actions recommended. Ongoing monitoring in accordance with the OMP.
First time detection of PFAS in surface water	Surface water monitoring location SW086 recorded a first-time detection of PFOS during the April 2021 sampling event. The location reported a value of 0.01 µg/L (equal to the LOR).	Surface water sampling locations both upstream and downstream show PFAS concentrations similar to or greater than the PFAS concentrations found at SW086. As this is a relatively low detection and it doesn't correspond with changing conditions upstream or downstream, no further action is recommended at this time. Ongoing monitoring in accordance with the OMP.
First time exceedance of PFAS ecological criteria in surface water	Surface water monitoring location SW086 recorded a first-time exceedance of PFOS in comparison to the NEMP 99 percent Species Protection criterion during the April 2021 sampling event. The location reported a value of 0.01 µg/L.	Surface water sampling locations both upstream and downstream show PFAS concentrations similar to or greater than the PFAS concentrations found at SW086. As this is a relatively low detection and it doesn't correspond with changing conditions upstream or downstream, no further action is recommended at this time. Ongoing monitoring in accordance with the OMP.
Exceedance of NHMRC recreational guideline for recreational use from sampling locations along Milners Creek	Concentrations of PFAS did not exceed the NHMRC recreational guideline at sampling locations at locations along Milners Creek during the April 2021 sampling event.	No actions recommended Ongoing monitoring in accordance with the OMP.

5.2 Upcoming Sampling Events

The next biannual sampling event is scheduled for November 2021. The next annual sediment sampling will be undertaken during the April 2022 sampling event.

5.3 Upcoming Annual Interpretive Report

The second annual interpretive report is scheduled to be delivered in June 2021.

6.0 References

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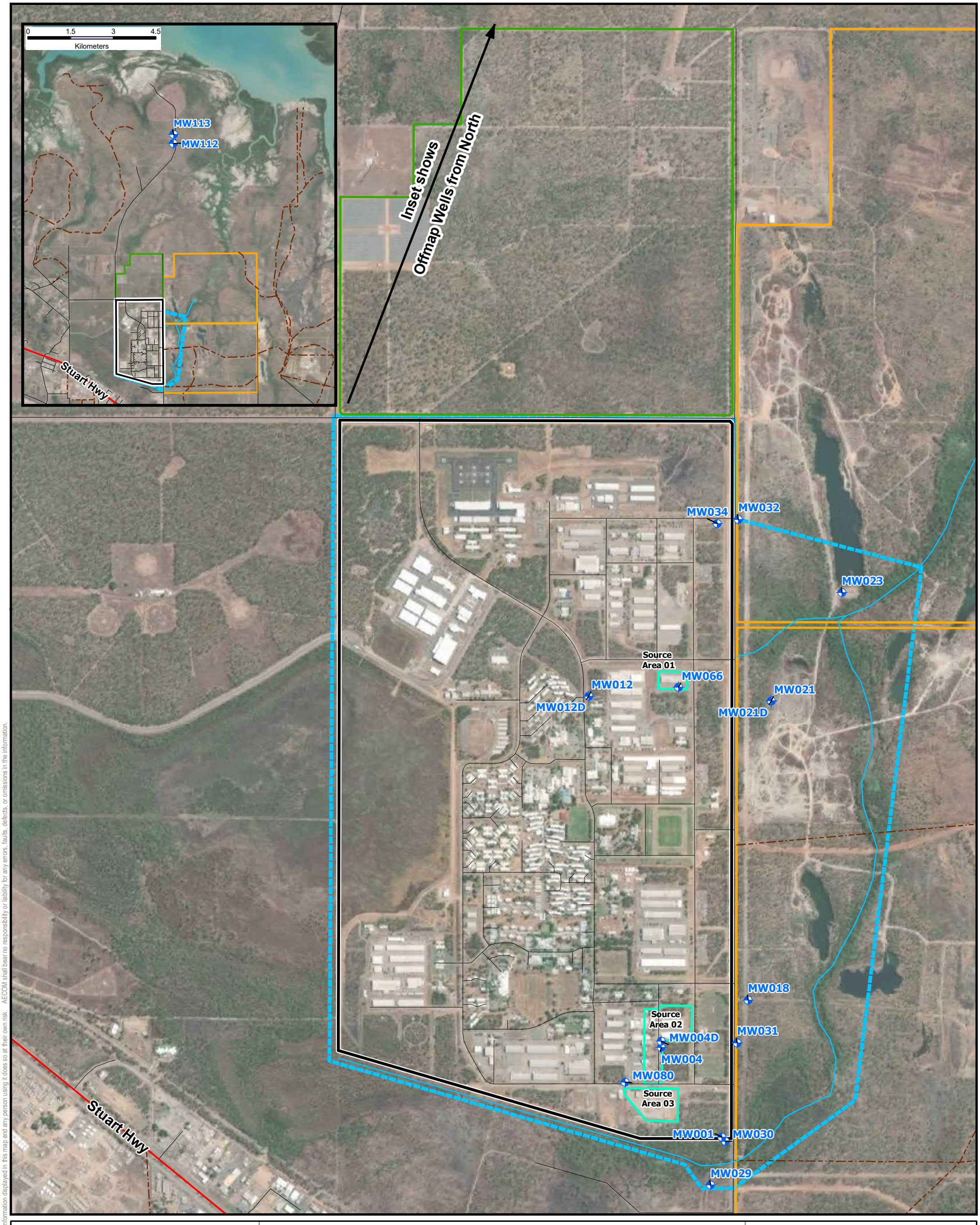
Appendix A

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

- Groundwater Monitoring 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
Groundwater Sampling Locations

April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted] 04 JUN 2021
VERSION:	1

Figure
1

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F01_RobertsonBarracks_GWLocation_A3P.mxd

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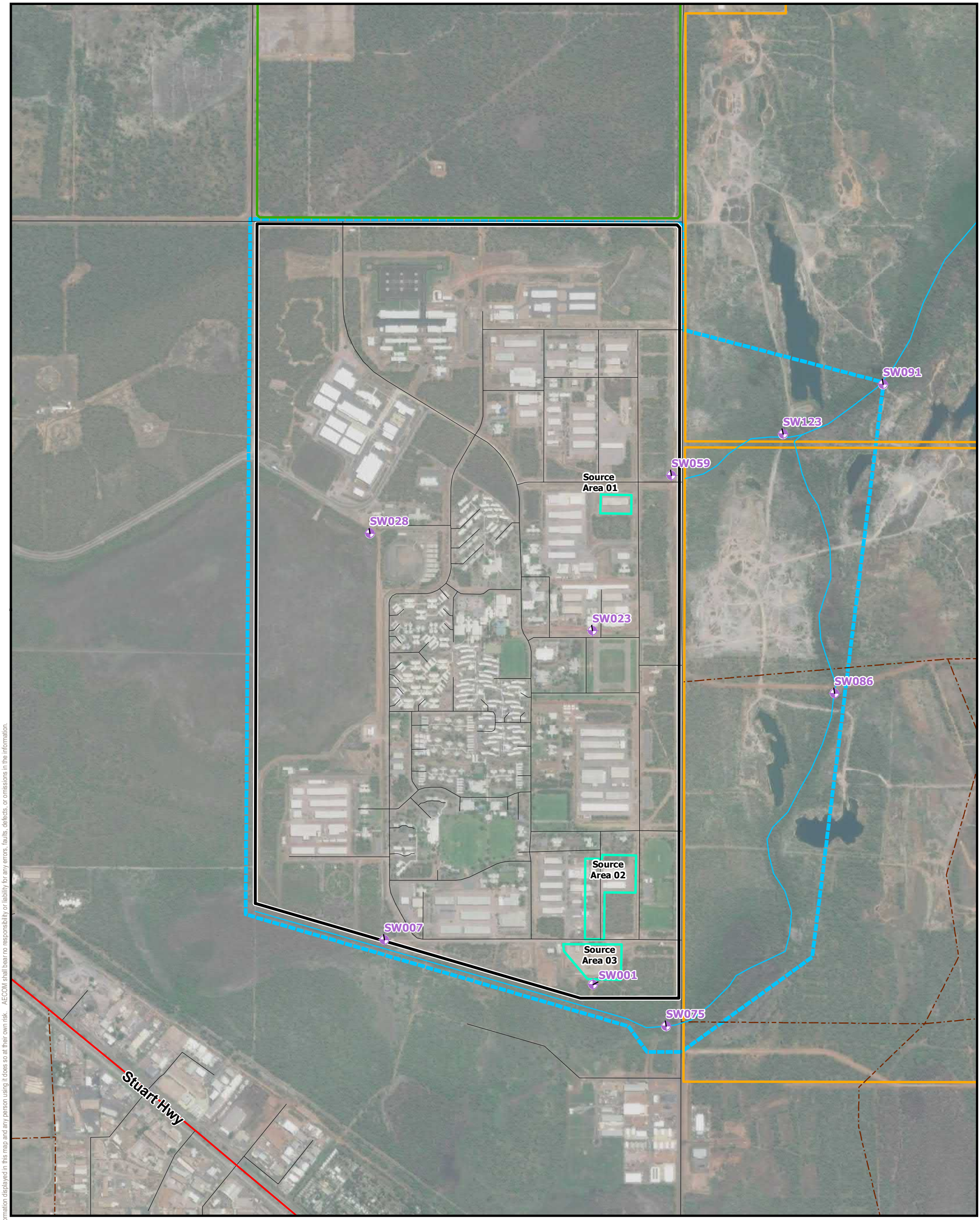

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N

DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:13,000 (when printed at A3)

LEGEND

- 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

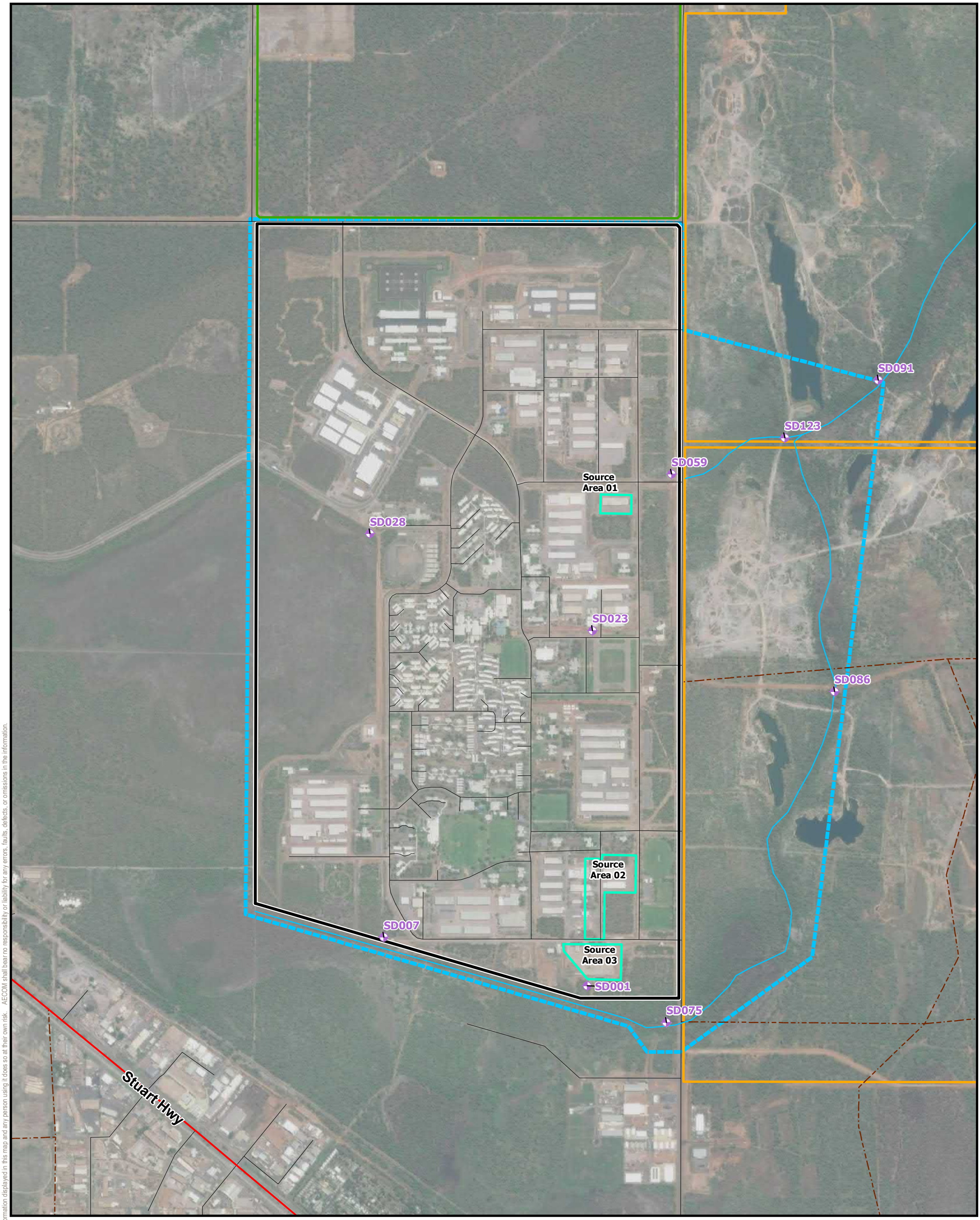
April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	04 JUN 2021
VERSION:	1

Figure 2

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F02_RobertsonBarracks_SWLocation_A3P.mxd

A3 size



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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:13,000 (when printed at A3)

LEGEND

- Sediment Sampling 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
Sediment Sampling Locations

April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	04 JUN 2021
VERSION:	1

Figure 3

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F03_RobertsonBarracks_SDLocations_A3P.mxd

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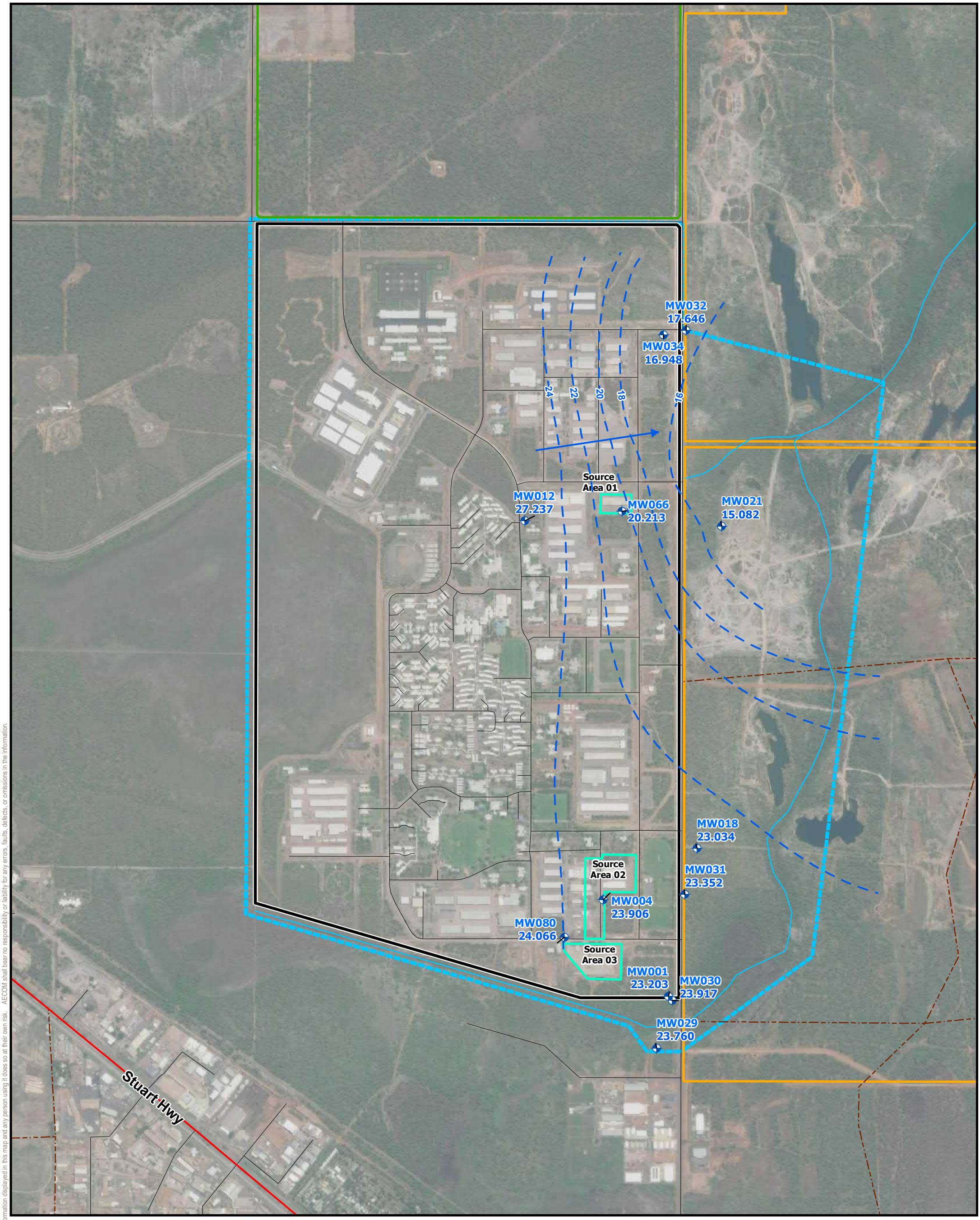

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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:13,000 (when printed at A3)

LEGEND

- Groundwater Monitoring 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 2019
GW data AECOM 2019

Department of Defence

Robertson Barracks
Inferred Groundwater Contours

April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted] 04 JUN 2021
VERSION:	1

Figure
4

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F04_RobertsonBarracks_GWContour_A3P.mxd

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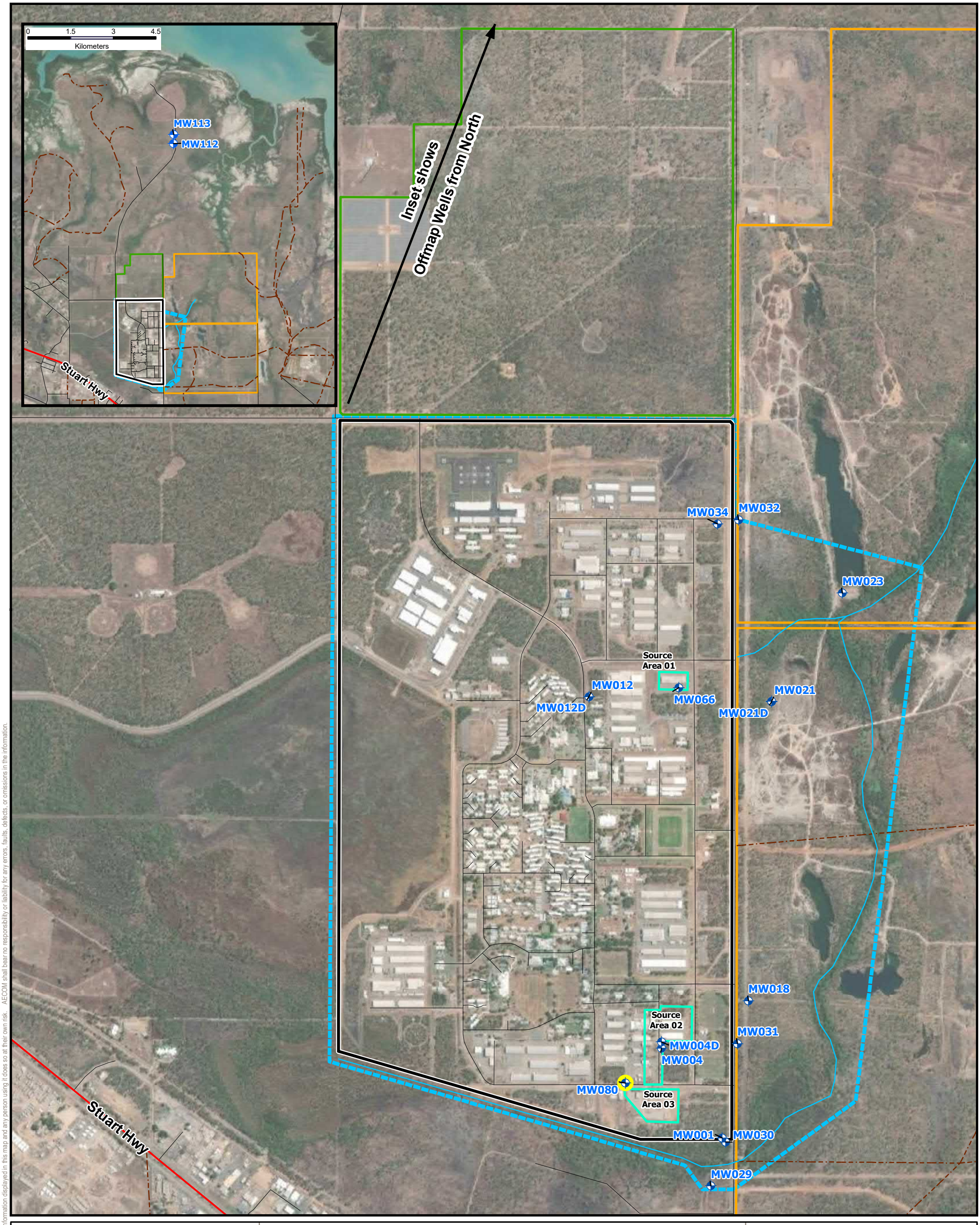

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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500
metres

1:14,000 (when printed at A3)

LEGEND

- Groundwater Monitoring Locations
- Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
- Denotes new exceedance of guideline values
- Monitoring Area
- Source Area

Site Layout

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

Note: MW080 exceeds the NEMP Human Health Drinking Water value of 0.07 µg/L.

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

Department of Defence

Robertson Barracks Groundwater Results

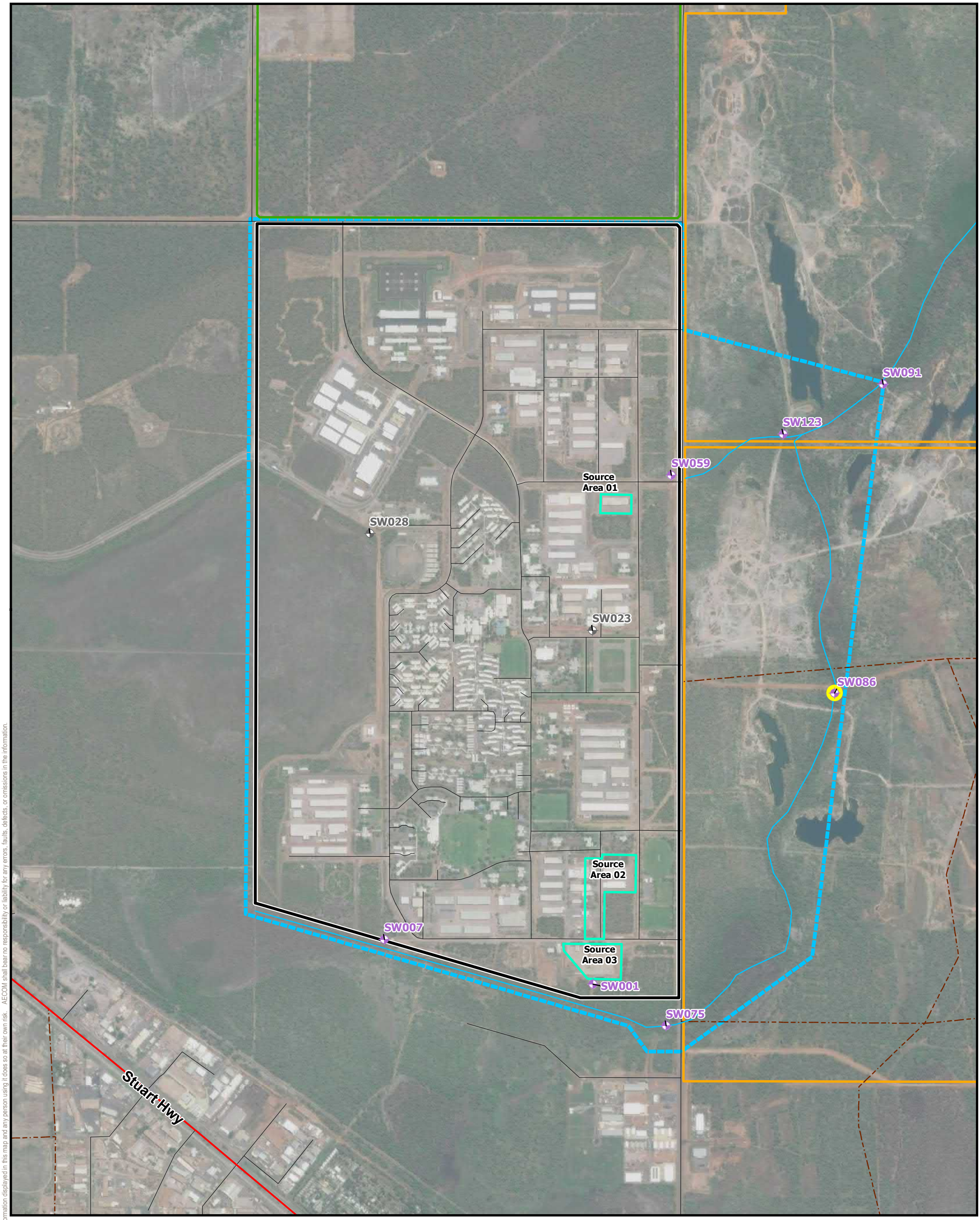
April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted] 04 JUN 2021
VERSION:	1

Figure 5

A3 size

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F05_RobertsonBarracks_GWResults_A3P.mxd



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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

- Surface Water Locations
- Dry
- Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
- Denotes new exceedance of guideline values
- Monitoring Area
- Source Area

Site Layout

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

Note: SW086 exceeds the NEMP 99 percent species protection value of 0.00023 µg/L.

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

Department of Defence

Robertson Barracks Surface Water Results

April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	[redacted] - 04 JUN 2021
VERSION:	1

Figure 6

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F06_RobertsonBarracks_SWResults_A3P.mxd

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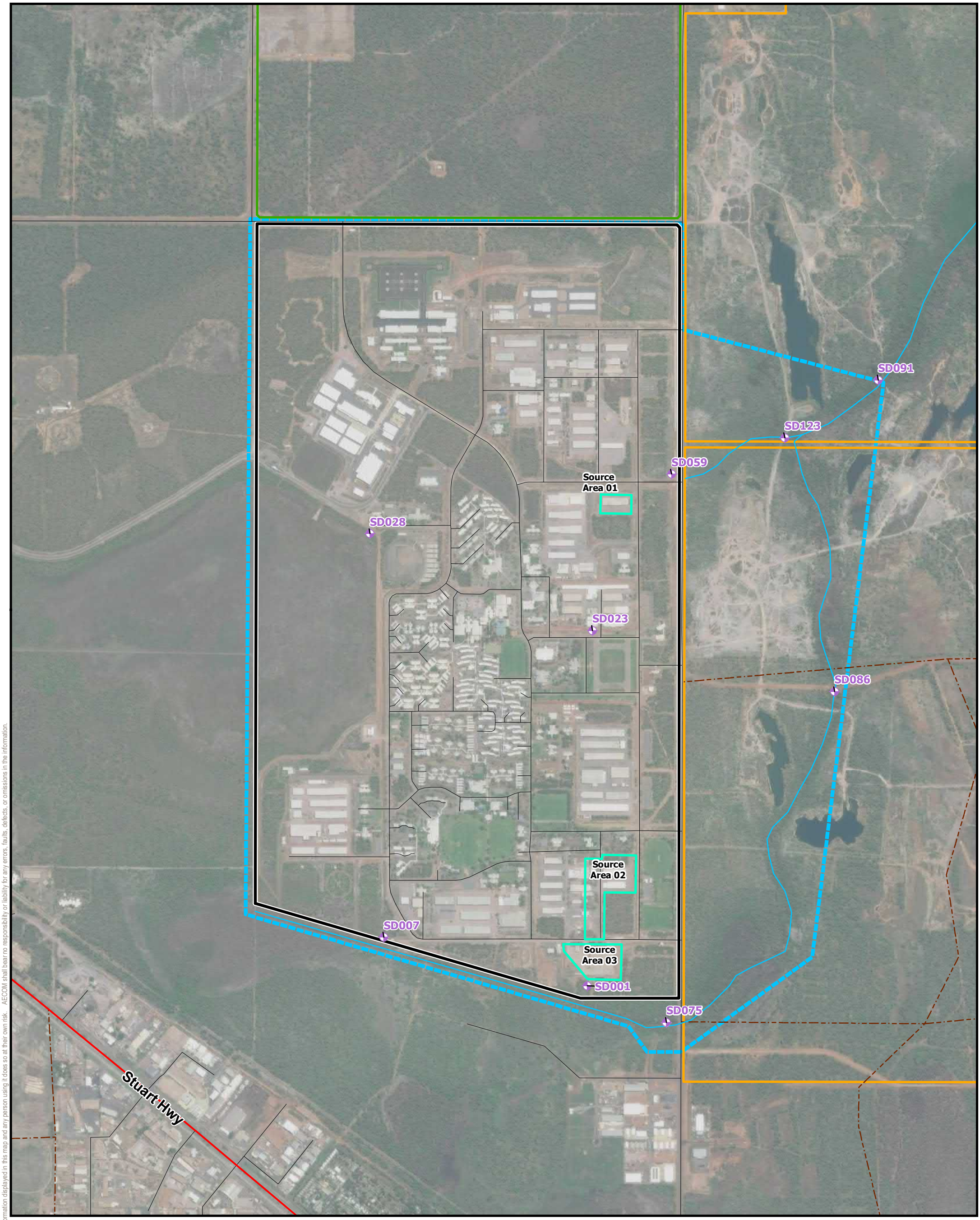

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DATUM GDA 1994, PROJECTION MGA ZONE 52

0 125 250 500

metres

1:13,000 (when printed at A3)

LEGEND

- Sediment Locations
- Monitoring Area
- Source Area
- **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 Results

April 2021 Sampling Event

PROJECT ID	60612561
CREATED BY	[redacted]
LAST MODIFIED	04 JUN 2021
VERSION:	1

Figure 7

Filename: P:\606x\60612561\900_CAD_GIS\920_GIS\60612561_Darwin_Def\02_MXDs\RobertsonBarracks\Working\Version 10.6\Q2_April_2021\60612561_F07_RobertsonBarracks_SDResults_A3P.mxd

A3 size

Appendix B

Tables

Table T1
Groundwater Field Results
PFAS OMP
Department of Defence - Robertson Barracks

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	15/04/2021	1.17	-	23.2	24.37	Good	0.9	46.5	30.2	5.6	141.6	341.6	30.6	Cloudy	Grey	Odourless	No Sheen	Hydrasleeve	
MW004	15/04/2021	2.87	3.03	23.9	26.78	Good	0.14	814	529.1	6.6	-155.4	44.6	32.3	Cloudy	Grey	Odourless	No Sheen	Hydrasleeve	
MW004D	15/04/2021	2.81	31.28	24.0	26.78	Good	0.71	367.5	238.9	6.7	-60.1	139.9	31.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	
MW012	15/04/2021	3.41	10.08	27.2	30.65	Good	0.85	56.8	36.9	5.5	98.5	298.5	32.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	
MW012D	15/04/2021	5.18	32.00	25.6	30.77	Good	0.62	47.1	30.6	6.2	91.6	291.6	31.4	Clear	Colourless	Hydrogen Sulphide Odour	No Sheen	Hydrasleeve	
MW018	15/04/2021	2.54	8.72	23.0	25.57	Good	1.3	43.2	28.1	5.5	155.5	355.5	30.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	
MW021	15/04/2021	2.95	8.47	15.1	18.03	Good	0.9	63.6	41.3	5.2	175.2	375.2	30.8	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	
MW021D	15/04/2021	2.22	31.18	15.8	17.99	Good	1.08	144.3	93.8	6.0	135.1	335.1	29.8	Cloudy	Red	Odourless	No Sheen	Hydrasleeve	
MW023	15/04/2021	5.66	6.75	6.4	12.10	Good	1.26	166.8	108.4	6.1	114.7	314.7	30.4	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	
MW030	15/04/2021	0.08	7.17	23.9	24.00	Good	0.6	40.3	26.2	6.7	182.7	382.7	29.8	Cloudy	Colourless	Odourless	No Sheen	Hydrasleeve	
MW034	15/04/2021	2.55	11.47	16.9	19.50	Good	0.77	41.5	27.0	5.7	176.9	376.9	32.6	Clear	Colourless	Slight Organic Odour	No Sheen	Hydrasleeve	
MW080	15/04/2021	2.49	12.99	24.1	26.56	Good	0.67	355.2	230.9	6.3	-5.3	194.7	31.6	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	Roots present on sleeve when retrieved.
MW029	16/04/2021	1.68	7.80	23.8	25.44	Good	0.5	53	34.5	6.3	73.1	273.1	29.6	Cloudy	Brown	Odourless	No Sheen	Hydrasleeve	Sediment collecting at bottom of the well.
MW031	16/04/2021	2.21	8.22	23.4	25.56	Good	0.81	42.3	27.5	5.8	122.9	322.9	29.6	Cloudy	Brown	Odourless	No Sheen	Hydrasleeve	Roots present on sleeve when retrieved.
MW032	16/04/2021	2.22	8.72	17.6	19.86	Good	0.95	29.1	18.9	6.0	129.3	329.3	30.1	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	Sediment collecting at bottom of the well.
MW066	16/04/2021	2.98	11.95	20.2	23.19	Damaged Gatic Cover	1.51	51.4	33.4	5.1	218.3	418.3	30.5	Clear	Colourless	Odourless	No Sheen	Hydrasleeve	Red Sediment collecting at bottom of the well.
MW112	16/04/2021	Did not measure due to tapped well					2.13	375.7	244.2	6.9	-50.1	149.9	31.6	Clear	Colourless	Odourless	No Sheen	Grab Sample	
MW113	16/04/2021	Did not measure due to tapped well					1.32	324.1	210.7	6.8	-78.9	121.1	31.7	Clear	Colourless	Hydrogen Sulphide 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 T2
Groundwater PFAS Results
PFAS OMP
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	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
				PQL	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	0.02
Ecological Receptors	**PFAS NEMP FW 99% Species Protection**																														**0.00023**	**19**	
Human Health	**PFAS NEMP Human Health Drinking Water**																													**0.07**		**0.56**	
Receptors	**NHMRC (2019) PFAS Recreational Water**																													**2**		**10**	
Location Code	**Field ID**	**Sampled Date**	**Sampe Type**	**Lab Report Number**																														
MW001	1200_MW001_210415	15/04/2021	Normal	ES2114376	<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_210415	15/04/2021	Normal	ES2114376	<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	0.04	<0.05	<0.02	<0.02	0.25	**0.18**	**0.15**	<0.01^	0.03
	1200_QC101_210415	15/04/2021	Intralab Duplicate	ES2114376	<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	0.07	<0.05	<0.02	<0.02	0.4	**0.28**	**0.24**	<0.01^	0.04
	1200_QC201_210415	15/04/2021	Interlab Duplicate	EB2110991	<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	0.04	<0.05	<0.02	<0.02	0.27	**0.2**	**0.17**	<0.01^	0.03
MW004D	1200_MW004D_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
MW012	1200_MW012_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
MW012D	1200_MW012D_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
MW018	1200_MW018_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
	1200_QC100_210415	15/04/2021	Intralab Duplicate	ES2114376	<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^	<0.02
	1200_QC200_210415	15/04/2021	Interlab Duplicate	EB2110991	<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^	<0.02
MW021	1200_MW021_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
MW021D	1200_MW021D_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
MW023	1200_MW023_210415	15/04/2021	Normal	ES2114376	<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^	<0.02
MW029	1200_MW029_210416	16/04/2021	Normal	ES2114376	<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^	<0.02
MW030	1200_MW030_210415	15/04/2021	Normal	ES2114376	<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	0.15	**0.13**	**0.09**	<0.01^	0.04
MW031	1200_MW031_210416	16/04/2021	Normal	ES2114376	<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^	<0.02
MW032	1200_MW032_210416	16/04/2021	Normal	ES2114376	<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	0.06	<0.05	<0.02	<0.02	0.19	**0.08**	**0.05**	<0.01^	0.03
MW034	1200_MW034_210415	15/04/2021	Normal	ES2114376	<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	0.04	<0.05	<0.02	<0.02	0.14	**0.07**	**0.04**	<0.01^	0.03
MW066	1200_MW066_210416	16/04/2021	Normal	ES2114376	<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	0.57	**0.51**	**0.39**	0.02	0.12
MW080	1200_MW080_210415	15/04/2021	Normal	ES2114376	<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	0.07	<0.02	<0.02	<0.02	0.13	<0.05	<0.02	<0.02	0.34	**0.12**	**0.08**	<0.01^	0.04
MW112	1200_MW112_210416	16/04/2021	Normal	ES2114376	<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^	<0.02
MW113	1200_MW113_210416	16/04/2021	Normal	ES2114376	<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^	<0.02

Notes:
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedence of guidance values
Bold indicates exceedence of screening criteria.
^ LOR Exceeds adopted screening criteria
PQL: Practical Quantitation Limit
µg/L: micrograms per Litre

Table T3
Surface Water Field Results
PFAS OMP
Department of Defence - Robertson Barracks

Surface Water Field Measurements													
Location ID	**Sampled Date**	**DO (mg/L)**	**EC (µS/cm)**	**TDS (calc) (mg/L)**	**pH**	**Redox (mV)**	**Redox (corr) (mV)**	**Temp (^{o}C)**	**Turbidity**	**Water Colour**	**Odour**	**Sheen**	**Sample Method**
SW001	15/04/2021 14:13	4.56	55.8	36.3	6.2	107.1	307.1	34.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW007	15/04/2021 14:27	6.8	21.7	14.1	5.4	208.8	408.8	32.8	Clear	Colourless	Hydrogen Sulphide Odour	No Sheen	Grab Sample
SW023	15/05/2021 16:05	Sampling Location was Dry											
SW028	15/04/2021 16:45	Sampling Location was Dry											
SW059	15/04/2021 10:20	4.3	27.5	17.9	6.7	97.4	297.4	35	Clear	Colourless	Slight Organic Odour	No Sheen	Grab Sample
SW075	15/04/2021 8:30	-	28.3	18.4	5.5	158.6	358.6	31.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW086	15/04/2021 11:53	4.73	23.5	15.3	5.3	133.2	333.2	28.8	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW091	15/04/2021 14:30	4.75	25.7	16.7	7.9	70.1	270.1	28.5	Clear	Colourless	Odourless	No Sheen	Grab Sample
SW123	15/04/2021 11:37	3.64	19.1	12.4	6.2	114.9	314.9	29.3	Clear	Colourless	Odourless	No Sheen	Grab Sample

Notes:
mg/L: milligram per Litre
µS/cm: microsiemens per centimetre
mV: millivolts
^{o}C: degrees celcius

Table T4
Surface Water PFAS Results
PFAS OMP
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
				PQL	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	0.05	0.02	0.02	0.02	0.02	0.05	0.02	0.02	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**	**Sampled Date**	**Lab Report Number**	**Sample Type**																														
SW001	1200_SW001_210415	15/04/2021	ES2114376	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	<0.02
SW007	1200_SW007_210415	15/04/2021	ES2114376	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	<0.02
SW059	1200_SW059_210415	15/04/2021	ES2114376	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	0.05	0.05	**0.03**	<0.01	0.02
SW075	1200_SW075_210415	15/04/2021	ES2114376	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	<0.02
SW086	1200_SW086_210415	15/04/2021	ES2114376	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	<0.02
SW091	1200_SW091_210415	15/04/2021	ES2114376	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	<0.02
	1200_QC202_210415	15/04/2021	EB2110991	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	<0.02	<0.05	<0.02	<0.02	0.02	0.02	**0.02**	<0.01	<0.02
	1200_QC102_210415	15/04/2021	ES2114376	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	<0.02	<0.05	<0.02	<0.02	0.02	0.02	**0.02**	<0.01	<0.02
SW123	1200_SW123_210415	15/04/2021	ES2114376	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	<0.02

Notes:
Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedence of guideline values
^LOR Exceeds Adopted Screening Criteria
PQL: Practical Quantitation Limits
µg/L: micrograms per Litre

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

Sediment Field Observations					
Location ID	**Sampled Date**	**Sediment Colour**	**Sediment Characteristics**	**Sediment Odour**	**Sample Method**
SD001	15/04/2021 14:13	Reddy Brown	Silty SAND with gravels up to 15mm present.	Odourless	Sampling Pole
SD007	15/04/2021 14:27	Grey	No Characteristics Noted	Organic Odour	Sampling Pole
SD023	15/04/2021 16:05	Reddish Yellow	Fine SAND with lateritic and pea gravel (up to 10mm) present	Odourless	Sampling Pole
SD028	15/04/2021 16:45	Grey Brown	Silty SAND with minimal gravels of pea gravels up to 2mm present.	Odourless	Sampling Pole
SD059	15/04/2021 10:20	Reddish	Course SAND with lateritic and pea gravels present.	Odourless	Sampling Pole
SD075	15/04/2021 8:30	Grey	Silty SAND with some gravels present	Odourless	Sampling Pole
SD086	15/04/2021 11:53	Brown	Gravelly SAND (gravels up to 5mm) with some fine, organic particulate matter present.	Odourless	Sampling Pole
SD091	15/04/2021 14:30	No Colour Noted	No Characteristics Noted	No Odour Noted	Sampling Pole
SD123	15/04/2021 11:37	Brown	Silty SAND with lateritic gravels up to 10mm present.	Organic Odour	Sampling Pole

Table T6
Sediment PFAS Results
PFAS OMP
Department of Defence - Roberston 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	PHHxA	PFNA	FOSA	PFPeS	PFPeA	PFTeDA	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	mg/kg
		PQL	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	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Human Health Receptors	**PFAS NEMP Public Open Space**																													**1**		**10**	
Location ID	**Field ID**	**Sampled Date and Time**	**Lab Report**																															
SD001	1200_SD001_210415	15/04/2021 14:13	ES2114376	<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
SD007	1200_SD007_210415	15/04/2021 14:27	ES2114376	<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
	1200_QC103_210415	15/04/2021 14:30	ES2114376	<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
	1200_QC203_210415	15/04/2021 14:30	EB2110991	<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_210415	15/04/2021 15:27	ES2114376	<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_210415	15/04/2021 14:43	ES2114376	<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	0.0005	0.0005	0.0005	<0.0002	<0.0002	<0.0002
SD059	1200_SD059_210415	15/04/2021 16:05	ES2114376	<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
SD075	1200_SD075_210415	15/04/2021 16:45	ES2114376	<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
SD086	1200_SD086_210415	15/04/2021 10:20	ES2114376	<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
SD091	1200_SD091_210415	15/04/2021 8:30	ES2114376	<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_210415	15/04/2021 11:37	ES2114376	<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

Denotes first time detection above LOR for Sum of PFHxS+PFOS or PFOA
Denotes new exceedence of guideline values
Bold indicates exceedence of screening criteria.
^ LOR Exceeds adopted screening criteria
PQL: Practical Quantitation Limit
mg/kg: milligrams per kilogram

Appendix C

Sampling Logs

GROUNDWATER SAMPLING FIELD RECORD

AECOM

Project Name: PFAS OMP
Client: Department of Defence
Project Location: Robertson Barracks
Project Number: 60612561
Project Manager: [redacted]
Sampling Round: April / 2021
Fieldwork Staff: [redacted]
Chem Kit Serial No.:
Parameter Method: 452
Date: 15-4-2021

Site	Date	Time	Depth to GW	Well Depth (mbtoc)	Colour	Odour	pH	Temp (°C)	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	Turbidity	Observations: Odour, Colour, Turbidity	Field QAQC
SW091	15-4-21	0830	NA	NA	~~Brown~~ Light Brown	no	7.90	28.5	25.7	4.75	70.1	NA	Rapidly moving ~20m wide	D/T
SD091	15-4-21	0830	NA	NA	clear/light brown	odor			~~775.1~~ ~~5.8~~				" " " "	D/T
MW021	15-4-21	0935	8.47 ← 2.948		clear	none	5.19	30.8	~~745.1~~ 63.6	0.86	175.2			
MW021D	15-4-21	0935	← 2.219		cloudy red	none	5.95	29.8	144.3	1.08	135.1			
SW086	15-4-21	1020	NA	NA	clear	none	5.31	28.8	23.5	4.73	133.2		rapidly moving ~10m wide	
SD086	15-4-21	1020	NA	NA	and gravelly	Sands	with	some	fines	present			brown. (same as SD091).	
MW018	15-4-21	1040	2.536	8.715	clear	none	6.53	30.6	43.2	1.30	155.5			
MW023	15-4-21	1120	5.655	~~5.670~~ 6.23	clear	none	6.06	30.4	166.8	1.26	114.7			
SW123	15-4-21	1137	NA	NA	clear	None	6.23	29.3	19.1	3.64	114.9		moderate flow ~ 3 to 5m wide.	
SD123	15-4-21	1137	NA	NA	BROWN	Silty	Sand	with	<10mm	gravels.	Slight	organic	odour.	
MW080	15-4-21	1310	2.494	12.985	clear	none	6.30	31.6	355.2	0.67	-5.3		root impaction	
MW004	15-4-21	1325	2.874	2.030	grey	none	6.58	32.3	814	0.14	-155.4		root impaction / cloudy	D/T
MW004D	15-4-21	1330	2.808	NA	clear	none	6.71	31.8	367.5	0.71	-60.1			
MW001	15-4-21	1350	1.167	30.207	grey	none	5.58	30.6	46.5	0.89	141.6		cloudy	
SW001	15-4-21	1413	NA	NA	clear	hydrocarbon	6.23	34.5	55.8	4.56	107.1		clear	
SD001	15-4-21	1413	NA	NA	tea brown	Silty	Sand	w/	<15	mm	gravels		slow flow 10m wide	
SW007	15-4-21	1427	NA	NA	clear	hydrocarbon	5.42	32.8	21.7	6.75	208.8			
SD007	15-4-21	1427	NA	NA	grey	organic							slow flow 10m wide	
SW028	15-4-21	1443	NA	NA	DRY								DRY	
SD028	15-4-21	1443	NA	NA	grey/brown	Silty	Sand	w/	minimal	gravel	s	<2mm		

GROUNDWATER SAMPLING FIELD RECORD

Project Name: PFAS OMP
Client: Department of Defence
Project Location: Robertson Barracks
Project Number: 60612561
Project Manager: [redacted]
Sampling Round: April 2021
Fieldwork Staff: [redacted]
Chem Kit Serial No.: NA
Parameter Method: YSI
Date: 15-16/4/2021

AECOM

Site	Date	Time	Depth to GW	Well Depth (mbtoc)	Colour	Odour	pH	Temp (°C)	E.C. (mS/cm or µS/cm)	DO (ppm or mg/L)	Redox (mV)	Turbidity	Observations: Odour, Colour, Turbidity	Field QAQC
MW012	15-4-21	1455	3.413	10.08	Clear	none	5.53	32.6	56.8	0.85	98.5	NA		
MW0120	15-4-21	1455	5.178	32.0	Clear	Hydro sulfide	6.17	31.4	47.1	0.62	91.6			
SW023	15-4-21	1527	DRY	NA									DRY	
SD023	15-4-21	1527	NA	NA	red/yellow	NA	Fine Sands		laterite & red. gravel				DRY	
MW034	15-4-21	1553	2.552	11.47	Clear	Slight organic	5.69	32.6	41.5	0.77	176.9			
SW059	15-4-21	1605	NA	NA	clear	Slight organic	6.72	35.0	27.5	4.31	92.4		5m wide, NO flow.	
SD059	15-4-21	1605	NA	NA	redish	course	Sand	with	some	gravels				
MW030	15-4-21	1630	0.08	7.168	Cloudy	none	6.73	29.8	40.3	0.60	182.7			
SW075	15-4-21	1645	NA	NA	clear	none	5.45	31.8	28.3	~~6.78~~ 4.96	158.6		moderate flow 25M wide	
SD075	15-4-21	1645	NA	NA	grey	none	silty Sand						Some gravels	Rinsate
MW029	16-4-21	0730	1.676	7.800	brown	none	6.34	29.6	53.0	0.50	73.1		cloudy soft bottom	
MW031	16-4-21	0750	2.206	8.220	brown	none	5.84	29.6	42.3	0.81	122.9		cloudy, some roots	
MW032	16-4-21	0810	2.216	8.715	clear	none	6.03	30.1	29.1	0.95	129.3		soft bottom	
MW066	16-4-21	0840	2.977	11.95	clear	none	5.10	30.5	51.4	1.51	218.3		some red sediment at bottom	
MW112	16-4-21	1000	NA	NA	clear	none	6.88	31.6	375.7	2.13	-50.1			
MW113	16-4-21	1013	NA	NA	clear	hydrogen sulfide	6.79	31.7	324.1	1.32	-78.9			

FIELDWORK QUALITY MANUAL

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FQM-1.11-F1 – SAMPLE QAQC TRACKING SHEET

Project Name: PFAS OMP	PFAS OMP	Project Number:	60612561
Date: 15-4-21	15-4-21	Client:	Department of Defence
Project Location: Robertson	NT, Australia	Fieldwork Staff:	[redacted]
PM Name: [redacted]	[redacted]		

QAQC INFORMATION

QAQC ID	Primary Sample ID	Sample Type	Date
Groundwater			
1200_QC103_210415	1200_SD091_210415	SD	15-04-2021
1200_QC203_210415	1200_SD091_210415	SD	15-04-2021
1200_QC102-210415	1200_SW091_210415	SW	15-04-2021
1200_QC202-210415	1200_SW091_210415	SW	15-04-2021
1200_QC100_210415	1200_MW018_210415	GW	15-04-2021
1200_QC200_210415	1200_MW018_210415	GW	15_04_2021
1200_QC101_210415	1200_MW004_210415	GW	15_04_2021
1200_QC201_210415	1200_MW004_210415	GW	15_04_2021
Surface Water			

QA\QC PROJECT REQUIREMENTS

Quality control duplicate samples

Blind duplicate (duplicate)	0990_QC1XX_YYMMDD
Inter-Laboratory duplicate (triplicate)	0990_QC2XX_YYMMDD
Rinsate	0990_QC3XX_YYMMDD
Field Blank	0990_QC4XX_YYMMDD
Trip Blank	0990_QC5XX_YYMMDD

QAQC	Required		Frequency		Method Used
Field Duplicates	☐ Yes	☐ No	☐ 1 in 10	☐ 1 in 20	
Field Triplicates	☐ Yes	☐ No	☐ 1 in 10	☐ 1 in 20	
Rinsate Blanks	☐ Yes	☐ No	☐ 1 per matrix/equipment/day		
Field Blanks	☐ Yes	☐ No	☐ 1 per day		
Trip Blanks	☐ Yes	☐ No	☐ 1 per ice chest		
Trip Spikes	☐ Yes	☐ No	☐ 1 per ice chest		

Approval and Distribution

[redacted]

Date

16-4-21

Date

Distribution: Project File

Appendix D

Data Validation Report

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DATA VALIDATION REPORT - GROUNDWATER

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:** 17/05/2021	[redacted]
Site:	1200 – Robertson Barracks		
Matrix:	Water	**Data Verified by:**	[redacted]
Laboratory:	ALS	**Date:** 19/05/2021	[redacted]
Lab reference:	ES2114376; EB2110991		

Key Findings:

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

- Elevated RPDs should be taken into consideration when using data for Sum of PFAS quantitatively.
- Elevated RPDs should be taken into consideration when interpreting data for PFOS and Sum of PFOS + PFHxS where close to guidelines.

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)		✓			
Blank analysis	Field blank	✓			
	Rinsate blank	✓			
	Trip blank	✓			
	Method blank	✓			
Field intra-laboratory relative percent differences (RPDs)			✓	3	No
Field inter-laboratory RPDs		✓			
Laboratory duplicate RPDs		✓			
Matrix spike (MS) % recoveries		✓			
Laboratory control spike (LCS) % recoveries		✓			
Surrogate % recoveries		✓			
Other observations		✓			

1 of 2

Comments	
1. Sample handling/ preservation/ holding times	**Handling/preservation** Sample receipt temperature (10°C) was outside of the recommended range (≤6°C) in primary batch ES2114376. The inter-laboratory samples were received at the secondary laboratory at an acceptable temperature. As the samples were received only marginally outside of the specified temperature range and the sample was immediately cooled upon collection, the potential for under reporting is not considered to materially affect the interpretation of results.
2. Frequency of Laboratory QA/QC	Laboratory duplicate samples were not reported at the required frequencies for PFASs analytes. The precision of the data can be assessed as acceptable based on the available laboratory duplicate RPDs and the intra- and inter-laboratory duplicate RPDs which were reported at the required frequencies and generally within control limits. Refer Comment 3 for further on accuracy. Matrix spikes were not reported at the required frequencies for PFAS analytes method groups. 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).
3. Field intra-laboratory duplicate RPDs	Field intra-laboratory duplicate RPDs were reported within control limits, with the exception of PFOS, Sum of PFOS + PFHxS and Sum of PFAS (as shown in the RPD table). As there are no adopted guideline values for Sum of PFAS the elevated RPD is not expected to affect interpretation of results against guidelines. However, the elevated RPDs should be taken into consideration when using the data quantitatively. This apparent lack of precision should be taken into consideration when interpreting concentrations for PFOS and Sum of PFOS + PFHxS close to guidelines.

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DATA VALIDATION REPORT – SURFACE WATER

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:** 17/05/2021	[redacted]
Site:	1200 – Robertson Barracks		
Matrix:	Water	**Data Verified by:**	[redacted]
Laboratory:	ALS	**Date:** 19/05/2021	[redacted]
Lab reference:	ES2114376; EB2110991		

Key Findings:

The surface water analytical results can be used as a basis for interpretation.

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)		✓			
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		✓			

Comments

1. Sample handling/ preservation/ holding times	**Handling/preservation** Sample receipt temperature (10°C) was outside of the recommended range (≤6°C) in primary batch ES2114376. The inter-laboratory sample was received at the secondary laboratory at an acceptable temperature. As the samples were received only marginally outside of the specified temperature range and the sample was immediately cooled upon collection, the potential for under reporting is not considered to materially affect the interpretation of results.
2. Frequency of Laboratory QA/QC	Laboratory duplicate samples were not reported at the required frequencies for PFASs analytes. The precision of the data can be assessed as acceptable based on the available laboratory duplicate RPDs and the 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 method groups. 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).

1 of 1

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DATA VALIDATION REPORT - SEDIMENT

Project Manager:	[redacted]	**Validation by:**	[redacted]
Project number:	60612561	**Date:** 17/05/2021	[redacted]
Site:	1200 – Robertson Barracks		
Matrix:	Sediment	**Data Verified by:**	[redacted]
Laboratory:	ALS	**Date:** 19/05/2021	[redacted]
Lab reference:	ES2114376; EB2110991		

Key Findings:

The sediment analytical data can be used as a basis for interpretation.

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		✓			
Limits of reporting (LOR)		✓			
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		✓			

Comments

1. Sample handling/ preservation/ holding times	**Handling/preservation** Sample receipt temperature (10°C) was outside of the recommended range (≤6°C) in primary batch ES2114376. The inter-laboratory sample was received at the secondary laboratory at an acceptable temperature. As the samples were received only marginally outside of the specified temperature range and the sample was immediately cooled upon collection, the potential for under reporting is not considered to materially affect the interpretation of results.

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Table T7
QAQC Blank Sample Analysis
PFAS OMP
Department of Defence - Roberston Barracks

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	Lab Report Number		ES2114376	ES2114376	ES2114376	ES2114376	ES2114376	ES2114376	ES2114376
	Field ID		1200_QC300_210415	1200_QC301_210415	1200_QC302_210416	1200_QC400_210415	1200_QC402_210416	1200_QC500_210415	1200_QC501_210416
	Sampled Date		15/04/2021	15/04/2021	16/04/2021	15/04/2021	16/04/2021	15/04/2021	16/04/2021
	Sample Type		Rinsate	Rinsate	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	<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
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
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
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	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
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	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
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	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
Perfluorobutane sulfonic acid (PFBS)	µg/L	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
Perfluorodecanesulfonic acid (PFDS)	µg/L	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
Perfluorododecanoic acid (PFDoDA)	µg/L	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
Perfluoroheptanoic acid (PFHpA)	µg/L	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	<0.02	<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
Perfluorooctane sulfonamide (FOSA)	µg/L	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
Perfluoropentanoic acid (PFPeA)	µg/L	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
Perfluorotridecanoic acid (PFTrDA)	µg/L	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
Sum of PFAS	µg/L	0.01	<0.01	<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	<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
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

	Lab Report Number	ES2114376	ES2114376		ES2114376	EB2110991		ES2114376	ES2114376		ES2114376	EB2110991	
	Field ID	1200_MW018_210415	1200_QC100_210415	RPD	1200_MW018_210415	1200_QC200_210415	RPD	1200_MW004_210415	1200_QC101_210415	RPD	1200_MW004_210415	1200_QC201_210415	RPD
	Sampled Date	15/04/2021	15/04/2021		15/04/2021	15/04/2021		15/04/2021	15/04/2021		15/04/2021	15/04/2021	
	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	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	0.03	0.05	50	0.03	0.03	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0	0.04	0.07	55	0.04	0.04	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	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	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	**0.25**	**0.4**	**46**	0.25	0.27	8
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	**0.18**	**0.28**	**43**	0.18	0.2	11
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	**0.15**	**0.24**	**46**	0.15	0.17	12
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	0.02	<0.02	<0.02	0	<0.02	<0.02	0	0.03	0.04	29	0.03	0.03	0

**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

	Lab Report Number	ES2114376	ES2114376		ES2114376	EB2110991	
	Field ID	1200_SW091_210415	1200_QC102_210415	RPD	1200_QC102_210415	1200_QC202_210415	RPD
	Sampled Date	15/05/2021	15/05/2021		15/04/2021	15/04/2021	
	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	<0.05	<0.05	0	<0.05	<0.05	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	0	<0.1	<0.1	0
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	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	<0.05	<0.05	0	<0.05	<0.05	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	<0.02	<0.02	0	<0.02	<0.02	0
Sum of PFAS	µg/L	0.01	0.02	0.02	0	0.02	0.02	0
Sum of PFHxS and PFOS	µg/L	0.01	0.02	0.02	0	0.02	0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.02	0.02	0	0.02	0.02	0
Perfluorooctanoic Acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.02	0

**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

	Lab Report Number	ES2114376	ES2114376	**RPD**		ES2114376	EB2110991	**RPD**	
	Field ID	1200_SD091_210415	1200_QC103_210415			1200_SD091_210415	1200_QC203_210415		
	Sampled Date	15/05/2021	15/05/2021			15/05/2021	15/05/2021		
	Sample Type	Primary	Intra-Lab Duplicate			Primary	Inter-Lab Duplicate		
Analyte	**Units**	**LOR**							
PFAS Full Suite									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
6:2 Fluorotelomer Sulfonate (6:2 FtS)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0		<0.001	<0.001	0
Perfluorodecanesulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Sum of PFAS	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Sum of PFHxS and PFOS	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorooctanoic Acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0		<0.0002	<0.0002	0

**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

Appendix E

Chain of Custody

CHAIN OF CUSTODY

ALS Laboratory: please tick →

[redacted]

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: AECOM Darwin	ALS QUOTE NO: SY/139/19 V3
PROJECT: PFAS OMP	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER: 60612561	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: 4.6 °C Other comment:
PROJECT MANAGER: [redacted]	CONTACT PH:
SAMPLER: [redacted]	SAMPLER MOBILE: [redacted]
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default): Esdat
Email Reports to: [redacted]	[redacted]
Email Invoice to (will default to PM if no other addresses are listed):	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:
[redacted]	19/04/2021	[redacted]	19/04/2021 1425
			21/4/21 9:45

1.0

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 Waters WATER	Surface Waters WATER	Groundwaters - Fresh WATER	PFAS SOIL		Trip Blank					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	1200_SW091_210415	15/04/2021	W	P	2	*	*									
2	1200_SD091_210415	15/04/2021	S	P	1				*							
3	1200_MW021_210415	15/04/2021	W	P	2	*		*								
4	1200_MW021D_210415	15/04/2021	W	P	2	*		*								
5	1200_SW086_210415	15/04/2021	W	P	2	*	*									
6	1200_SD086_210415	15/04/2021	S	P	1				*							
7	1200_MW018_210415	15/04/2021	W	P	2	*		*								
8	1200_MW023_210415	15/04/2021	W	P	2	*		*								
9	1200_SW123_210415	15/04/2021	W	P	2	*	*									
10	1200_SD123_210415	15/04/2021	S	P	1				*							
11	1200_MW080_210415	15/04/2021	W	P	2	*		*								
12	1200_MW004_210415	15/04/2021	W	P	3	*		*								Extra for lab QC
13	1200_MW004D_210415	15/04/2021	W	P	2	*		*								
14	1200_MW001_210415	15/04/2021	W	P	2	*		*								
15	1200_SW001_210415	15/04/2021	W	P	2	*	*									
16	1200_SD001_210415	15/04/2021	S	P	1				*							
17	1200_SW007_210415	15/04/2021	W	P	2	*	*									
18	1200_SD007_210415	15/04/2021	S	P	1				*							
19	1200_SW028_210415 N/R	15/04/2021	W	P	2											
20	1200_SD028_210415	15/04/2021	S	P	1				*							
21	1200_MW012_210415	15/04/2021	W	P	2	*		*								

AB OF ORIC DARWIN

Environmental Division
Brisbane
Work Order Reference
EB2110991

[redacted]

22	1200_MW012D_210415	15/04/2021	W	P	3	*		*								Extra for lab QC
23	1200_SW023_210415	15/04/2021	W	P	2	*	*									
24	1200_SD023_210415	15/04/2021	S	P	1				*							
25	1200_MW034_210415	15/04/2021	W	P	2	*		*								
26	1200_SW059_210415	15/04/2021	W	P	2	*	*									
27	1200_SD059_210415	15/04/2021	S	P	1				*							
28	1200_MW030_210415	15/04/2021	W	P	2	*		*								
29	1200_SW075_210415	15/04/2021	W	P	4	*	*									Extra for lab QC
30	1200_SD075_210415	15/04/2021	S	P	3				*							Extra for lab QC
31	1200_MW029_210416	16/04/2021	W	P	2	*		*								
32	1200_MW031_210416	16/04/2021	W	P	2	*		*								
33	1200_MW032_210416	16/04/2021	W	P	2	*		*								
34	1200_MW086_210416	16/04/2021	W	P	2	*		*								
35	1200_MW112_210416	16/04/2021	W	P	2	*		*								
36	1200_MW112_210416_FF	16/04/2021	W	P	3	*		*								
37	1200_MW113_210416	16/04/2021	W	P	2	*		*								
38	1200_MW113_210416_FF	16/04/2021	W	P	2	*		*								
39	1200_QC100_210415	15/04/2021	W	P	2	*										
40	1200_QC200_210415	15/04/2021	W	P	2	*										Please Forward to ALS Brisbane
41	1200_QC101_210415	15/04/2021	W	P	2	*										
42	1200_QC201_210415	15/04/2021	W	P	2	*										Please Forward to ALS Brisbane
43	1200_QC102_210415	15/04/2021	W	P	2	*										
44	1200_QC202_210415	15/04/2021	W	P	2	*										Please Forward to ALS Brisbane
45	1200_QC103_210415	15/04/2021	S	P	1	*			*							
46	1200_QC203_210415	15/04/2021	S	P	1	*			*							Please Forward to ALS Brisbane
47	1200_QC300_210415	15/04/2021	W	P	2	*										
48	1200_QC301_210415	15/04/2021	W	P	2	*										
49	1200_QC302_210416	16/04/2021	W	P	2	*										
50	1200_QC400_210415	15/04/2021	W	P	2	*										
51	1200_QC402_210416	16/04/2021	W	P	2	*										
52	1200_QC500_210415	15/04/2021	W	P	2							*				
53	1200_QC501_210416	16/04/2021	W	P	2							*				
					102											

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.

54. ~~SD075 extra~~ = 2

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

[redacted]

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)
E: AECOM Darwin		☐ Non Standard or urgent TAT (List due date):	
PROJECT: PFAS OMP	ALS QUOTE NO: SY/139/19 V3	COC SEQUENCE NUMBER (Circle)	
ORDER NUMBER: 60612561		COC: 1 2 3 4 5 6 7	
PROJECT MANAGER: [redacted]	CONTACT PH:	OF: 1 2 3 4 5 6 7	
SAMPLER: [redacted]	SAMPLER MOBILE: [redacted]	RELINQUISHED BY:	RECEIVED BY:
to ALS? (YES / NO)	EDD FORMAT (or default): Esdat		
Email Reports to: [redacted]		DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):		RELINQUISHED BY:	RECEIVED BY:
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		DATE/TIME:	DATE/TIME:

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).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS Waters WATER	Surface Waters WATER	Groundwaters - Fresh WATER	PFAS SOIL		Trip Blank			Additional Information
1	1200_SW091_210415	15/04/2021	W	P	2	*	*							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
2	1200_SD091_210415	15/04/2021	S	P	1				*					
3	1200_MW021_210415	15/04/2021	W	P	2	*		*						
4	1200_MW021D_210415	15/04/2021	W	P	2	*		*						
5	1200_SW086_210415	15/04/2021	W	P	2	*	*							
6	1200_SD086_210415	15/04/2021	S	P	1				*					
7	1200_MW018_210415	15/04/2021	W	P	2	*		*						
8	1200_MW023_210415	15/04/2021	W	P	2	*		*						
9	1200_SW123_210415	15/04/2021	W	P	2	*	*							
10	1200_SD123_210415	15/04/2021	S	P	1				*					
11	1200_MW080_210415	15/04/2021	W	P	2	*		*						
12	1200_MW004_210415	15/04/2021	W	P	3	*		*						Extra for lab QC
13	1200_MW004D_210415	15/04/2021	W	P	2	*		*						
14	1200_MW001_210415	15/04/2021	W	P	2	*		*						
15	1200_SW001_210415	15/04/2021	W	P	2	*	*							
16	1200_SD001_210415	15/04/2021	S	P	1				*					
17	1200_SW007_210415	15/04/2021	W	P	2	*	*							
18	1200_SD007_210415	15/04/2021	S	P	1				*					
19	1200_SW028_210415 Not Received	15/04/2021	W	P	2									
20	1200_SD028_210415	15/04/2021	S	P	1				*					
21	1200_MW012_210415	15/04/2021	W	P	2	*		*						

Environmental Division
Sydney
Work Order Reference
ES2114376

Telephone : +61-2-8784 8555

PFAS Jars only Received

22	1200_MW012D_210415	15/04/2021	W	P	3	*		*									Extra for lab QC
23	1200_SW023_210415 Not Received	15/04/2021	W	P	2	*	*										
24	1200_SD023_210415	15/04/2021	S	P	1				*								
25	1200_MW034_210415	15/04/2021	W	P	2	*		*									
26	1200_SW059_210415	15/04/2021	W	P	2	*	*										
27	1200_SD059_210415	15/04/2021	S	P	1				*								
28	1200_MW030_210415	15/04/2021	W	P	2	*		*									
29	1200_SW075_210415	15/04/2021	W	P	4	*	*										Extra for lab QC
30	1200_SD075_210415	15/04/2021	S	P	3				*								Extra for lab QC
31	1200_MW029_210416	16/04/2021	W	P	2	*		*									
32	1200_MW031_210416	16/04/2021	W	P	2	*		*									
33	1200_MW032_210416	16/04/2021	W	P	2	*		*									
34	1200_MW066_210416	16/04/2021	W	P	2	*		*									
35	1200_MW112_210416	16/04/2021	W	P	2	*		*									
36	1200_MW112_210416_FF	16/04/2021	W	P	3	*		*									
37	1200_MW113_210416	16/04/2021	W	P	2	*		*									
38	1200_MW113_210416_FF	16/04/2021	W	P	2	*		*									
39	1200_QC100_210415	15/04/2021	W	P	2	*											
40	1200_QC200_210415	15/04/2021	W	P	2	*											Please Forward to ALS Brisbane
41	1200_QC101_210415	15/04/2021	W	P	2	*											
42	1200_QC201_210415	15/04/2021	W	P	2	*											Please Forward to ALS Brisbane
43	1200_QC102_210415	15/04/2021	W	P	2	*											
44	1200_QC202_210415	15/04/2021	W	P	2	*											Please Forward to ALS Brisbane
45	1200_QC103_210415	15/04/2021	S	P	1	*			*								
46	1200_QC203_210415	15/04/2021	S	P	1	*			*								Please Forward to ALS Brisbane
47	1200_QC300_210415	15/04/2021	W	P	2	*											
48	1200_QC301_210415	15/04/2021	W	P	2	*											
49	1200_QC302_210416	16/04/2021	W	P	2	*											
50	1200_QC400_210415	15/04/2021	W	P	2	*											
51	1200_QC402_210416	16/04/2021	W	P	2	*											
52	1200_QC500_210415	15/04/2021	W	P	2							*					
53	1200_QC501_210416	16/04/2021	W	P	2							*					
					102												

Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
ric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Extra #54: no Sample ID: Extra for Lab QC - 15/04/21 9:46
Received

Appendix F

Laboratory Certificates

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2114376**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: [redacted]
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
E-mail	: [redacted]	E-mail	[redacted]
Telephone	: ----	Telephone	
Facsimile	: ----	Facsimile	
Project	: NT_1200_PFASOMP	Page	: 1 of 4
Order number	: 60612561	Quote number	: ES2019AECOMAU0030 (SY/139/19 V3)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 19-Apr-2021 13:55	Issue Date	: 26-Apr-2021
Client Requested Due Date	: 28-Apr-2021	Scheduled Reporting Date	: **28-Apr-2021**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 10 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 48 / 47
		No. of samples NOT collected	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
- **Sample #54: Extra sample received for lab QC with no sample name**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/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.

ES2114376-036 : [16-Apr-2021] : 1200_MW112_210416_FF
ES2114376-038 : [16-Apr-2021] : 1200_MW113_210416_FF
ES2114376-054 : [15-Apr-2021] : no sample id - Extra 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: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2114376-002	15-Apr-2021 00:00	1200_SD091_210415	✓	✓
ES2114376-006	15-Apr-2021 00:00	1200_SD086_210415	✓	✓
ES2114376-010	15-Apr-2021 00:00	1200_SD123_210415	✓	✓
ES2114376-016	15-Apr-2021 00:00	1200_SD001_210415	✓	✓
ES2114376-018	15-Apr-2021 00:00	1200_SD007_210415	✓	✓
ES2114376-020	15-Apr-2021 00:00	1200_SD028_210415	✓	✓
ES2114376-024	15-Apr-2021 00:00	1200_SD023_210415	✓	✓
ES2114376-027	15-Apr-2021 00:00	1200_SD059_210415	✓	✓
ES2114376-030	15-Apr-2021 00:00	1200_SD075_210415	✓	✓
ES2114376-045	15-Apr-2021 00:00	1200_QC103_210415	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2114376-001	15-Apr-2021 00:00	1200_SW091_210415		✓
ES2114376-003	15-Apr-2021 00:00	1200_MW021_210415		✓
ES2114376-004	15-Apr-2021 00:00	1200_MW021D_210415		✓
ES2114376-005	15-Apr-2021 00:00	1200_SW086_210415		✓
ES2114376-007	15-Apr-2021 00:00	1200_MW018_210415		✓
ES2114376-008	15-Apr-2021 00:00	1200_MW023_210415		✓
ES2114376-009	15-Apr-2021 00:00	1200_SW123_210415		✓
ES2114376-011	15-Apr-2021 00:00	1200_MW080_210415		✓
ES2114376-012	15-Apr-2021 00:00	1200_MW004_210415		✓
ES2114376-013	15-Apr-2021 00:00	1200_MW004D_210415		✓

			(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)
ES2114376-014	15-Apr-2021 00:00	1200_MW001_210415		✓
ES2114376-015	15-Apr-2021 00:00	1200_SW001_210415		✓
ES2114376-017	15-Apr-2021 00:00	1200_SW007_210415		✓
ES2114376-021	15-Apr-2021 00:00	1200_MW012_210415		✓
ES2114376-022	15-Apr-2021 00:00	1200_MW012D_210415		✓
ES2114376-025	15-Apr-2021 00:00	1200_MW034_210415		✓
ES2114376-026	15-Apr-2021 00:00	1200_SW059_210415		✓
ES2114376-028	15-Apr-2021 00:00	1200_MW030_210415		✓
ES2114376-029	15-Apr-2021 00:00	1200_SW075_210415		✓
ES2114376-031	16-Apr-2021 00:00	1200_MW029_210416		✓
ES2114376-032	16-Apr-2021 00:00	1200_MW031_210416		✓
ES2114376-033	16-Apr-2021 00:00	1200_MW032_210416		✓
ES2114376-034	16-Apr-2021 00:00	1200_MW066_210416		✓
ES2114376-035	16-Apr-2021 00:00	1200_MW112_210416		✓
ES2114376-036	16-Apr-2021 00:00	1200_MW112_210416_FF		✓
ES2114376-037	16-Apr-2021 00:00	1200_MW113_210416		✓
ES2114376-038	16-Apr-2021 00:00	1200_MW113_210416_FF		✓
ES2114376-039	15-Apr-2021 00:00	1200_QC100_210415		✓
ES2114376-041	15-Apr-2021 00:00	1200_QC101_210415		✓
ES2114376-043	15-Apr-2021 00:00	1200_QC102_210415		✓
ES2114376-047	15-Apr-2021 00:00	1200_QC300_210415		✓
ES2114376-048	15-Apr-2021 00:00	1200_QC301_210415		✓
ES2114376-049	16-Apr-2021 00:00	1200_QC302_210416		✓
ES2114376-050	15-Apr-2021 00:00	1200_QC400_210415		✓
ES2114376-051	16-Apr-2021 00:00	1200_QC402_210416		✓
ES2114376-052	15-Apr-2021 00:00	1200_QC500_210415		✓
ES2114376-053	16-Apr-2021 00:00	1200_QC501_210416		✓
ES2114376-054	15-Apr-2021 00:00	no sample id Extra ...	✓	

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]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *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]

- 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	
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	
- A4 - AU Tax Invoice (INV)	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	[redacted]
- *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	: **ES2114376**	Page	: 1 of 23
Client	: **AECOM Australia Pty Ltd**	Laboratory	: [redacted]
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 19-Apr-2021 13:55
Order number	: 60612561	Date Analysis Commenced	: 22-Apr-2021
C-O-C number	: ----	Issue Date	: 28-Apr-2021 10:20
Sampler	: ----		
Site	: ----		
Quote number	: SY/139/19 V3		
No. of samples received	: 50		
No. of samples analysed	: 47		

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 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 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: SOIL (Matrix: SOIL)				Sample ID	1200_SD091_210415	1200_SD086_210415	1200_SD123_210415	1200_SD001_210415	1200_SD007_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-002	ES2114376-006	ES2114376-010	ES2114376-016	ES2114376-018
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**19.0**	**22.6**	**23.6**	**22.0**	**47.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
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_SD091_210415	1200_SD086_210415	1200_SD123_210415	1200_SD001_210415	1200_SD007_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-002	ES2114376-006	ES2114376-010	ES2114376-016	ES2114376-018
					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	**0.0002**	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**101**	**116**	**116**	**116**	**110**
13C8-PFOA	----	0.0002	%		**110**	**102**	**108**	**100**	**110**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1200_SD028_210415	1200_SD023_210415	1200_SD059_210415	1200_SD075_210415	1200_QC103_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-020	ES2114376-024	ES2114376-027	ES2114376-030	ES2114376-045
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**11.5**	**4.0**	**19.8**	**21.1**	**20.2**
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	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1200_SD028_210415	1200_SD023_210415	1200_SD059_210415	1200_SD075_210415	1200_QC103_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-020	ES2114376-024	ES2114376-027	ES2114376-030	ES2114376-045
					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		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**116**	**112**	**114**	**120**	**116**
13C8-PFOA	----	0.0002	%		**104**	**104**	**103**	**105**	**108**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_SW091_210415	1200_MW021_210415	1200_MW021D_210415	1200_SW086_210415	1200_MW018_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-001	ES2114376-003	ES2114376-004	ES2114376-005	ES2114376-007
					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	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.02**	<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_SW091_210415	1200_MW021_210415	1200_MW021D_210415	1200_SW086_210415	1200_MW018_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-001	ES2114376-003	ES2114376-004	ES2114376-005	ES2114376-007
					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		**0.02**	<0.01	<0.01	**0.01**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.02**	<0.01	<0.01	**0.01**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.02**	<0.01	<0.01	**0.01**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**117**	**92.8**	**97.4**	**116**	**94.6**
13C8-PFOA	----	0.02	%		**102**	**96.8**	**96.0**	**102**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW023_210415	1200_SW123_210415	1200_MW080_210415	1200_MW004_210415	1200_MW004D_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-008	ES2114376-009	ES2114376-011	ES2114376-012	ES2114376-013
					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	0.02	µg/L		<0.02	<0.02	**0.04**	**0.03**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.02**	**0.08**	**0.15**	<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	**0.13**	**0.04**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.07**	**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	<0.01	<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_MW023_210415	1200_SW123_210415	1200_MW080_210415	1200_MW004_210415	1200_MW004D_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-008	ES2114376-009	ES2114376-011	ES2114376-012	ES2114376-013
					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**	**0.34**	**0.25**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	**0.12**	**0.18**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.02**	**0.34**	**0.25**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.8**	**119**	**101**	**88.9**	**119**
13C8-PFOA	----	0.02	%		**97.7**	**104**	**107**	**89.9**	**106**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW001_210415	1200_SW001_210415	1200_SW007_210415	1200_MW012_210415	1200_MW012D_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-014	ES2114376-015	ES2114376-017	ES2114376-021	ES2114376-022
					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	0.02	µg/L		**0.04**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.08**	**0.02**	<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_210415	1200_SW001_210415	1200_SW007_210415	1200_MW012_210415	1200_MW012D_210415
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-014	ES2114376-015	ES2114376-017	ES2114376-021	ES2114376-022
					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		**0.12**	**0.02**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.12**	**0.02**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.12**	**0.02**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**81.6**	**113**	**106**	**100**	**93.9**
13C8-PFOA	----	0.02	%		**82.0**	**106**	**104**	**102**	**95.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_MW034_210415	1200_SW059_210415	1200_MW030_210415	1200_SW075_210415	1200_MW029_210416
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-025	ES2114376-026	ES2114376-028	ES2114376-029	ES2114376-031
					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	0.02	µg/L		**0.03**	**0.02**	**0.04**	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.04**	**0.03**	**0.09**	**0.02**	<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		**0.04**	<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		<0.01	<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_MW034_210415	1200_SW059_210415	1200_MW030_210415	1200_SW075_210415	1200_MW029_210416
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-025	ES2114376-026	ES2114376-028	ES2114376-029	ES2114376-031
					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**	**0.05**	**0.15**	**0.02**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.07**	**0.05**	**0.13**	**0.02**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.14**	**0.05**	**0.15**	**0.02**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.0**	**110**	**106**	**96.1**	**118**
13C8-PFOA	----	0.02	%		**95.8**	**107**	**106**	**95.8**	**99.5**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW031_210416	1200_MW032_210416	1200_MW066_210416	1200_MW112_210416	1200_MW112_210416_FF
				Sampling date / time	16-Apr-2021 00:00	16-Apr-2021 00:00	16-Apr-2021 00:00	16-Apr-2021 00:00	16-Apr-2021 00:00
					ES2114376-032	ES2114376-033	ES2114376-034	ES2114376-035	ES2114376-036
					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	0.02	µg/L		<0.02	**0.03**	**0.12**	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.05**	**0.39**	<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	**0.06**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.05**	**0.04**	<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	**0.02**	<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_210416	1200_MW032_210416	1200_MW066_210416	1200_MW112_210416	1200_MW112_210416_FF
				Sampling date / time	16-Apr-2021 00:00	16-Apr-2021 00:00	16-Apr-2021 00:00	16-Apr-2021 00:00	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-032	ES2114376-033	ES2114376-034	ES2114376-035	ES2114376-036
					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	**0.19**	**0.57**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.08**	**0.51**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.19**	**0.57**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**117**	**111**	**116**	**119**	**114**
13C8-PFOA	----	0.02	%		**99.9**	**97.8**	**99.6**	**99.1**	**99.0**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	1200_MW113_210416	1200_MW113_210416_FF	1200_QC100_210415	1200_QC101_210415	1200_QC102_210415
				Sampling date / time	16-Apr-2021 00:00	16-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
					ES2114376-037	ES2114376-038	ES2114376-039	ES2114376-041	ES2114376-043
					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	0.02	µg/L		<0.02	<0.02	<0.02	**0.04**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.24**	**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	**0.07**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**0.05**	<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_MW113_210416	1200_MW113_210416_FF	1200_QC100_210415	1200_QC101_210415	1200_QC102_210415
				Sampling date / time	16-Apr-2021 00:00	16-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-037	ES2114376-038	ES2114376-039	ES2114376-041	ES2114376-043
					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	**0.40**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.28**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.40**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**118**	**112**	**118**	**116**	**119**
13C8-PFOA	----	0.02	%		**103**	**99.7**	**99.7**	**102**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC300_210415	1200_QC301_210415	1200_QC302_210416	1200_QC400_210415	1200_QC402_210416
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	16-Apr-2021 00:00	15-Apr-2021 00:00	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-047	ES2114376-048	ES2114376-049	ES2114376-050	ES2114376-051
					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	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	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_210415	1200_QC301_210415	1200_QC302_210416	1200_QC400_210415	1200_QC402_210416
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	16-Apr-2021 00:00	15-Apr-2021 00:00	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit		ES2114376-047	ES2114376-048	ES2114376-049	ES2114376-050	ES2114376-051
					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	%		114	118	110	120	117
13C8-PFOA	----	0.02	%		99.2	99.8	100	102	101

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC500_210415	1200_QC501_210416	----	----	----
				Sampling date / time	15-Apr-2021 00:00	16-Apr-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2114376-052	ES2114376-053	--------	--------	--------
					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	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
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_QC500_210415	1200_QC501_210416	----	----	----
				Sampling date / time	15-Apr-2021 00:00	16-Apr-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2114376-052	ES2114376-053	--------	--------	--------
					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	%		**117**	**114**	----	----	----
13C8-PFOA	----	0.02	%		**102**	**99.1**	----	----	----

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	: **ES2114376**	Page	: 1 of 12
Client	: **AECOM Australia Pty Ltd**	Laboratory	: [redacted]
Contact	: [redacted]	Contact	: [redacted]
Address	: [redacted]	Address	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 19-Apr-2021
Order number	: 60612561	Date Analysis Commenced	: 22-Apr-2021
C-O-C number	: ----	Issue Date	: 28-Apr-2021
Sampler	: ----		
Site	: ----		
Quote number	: SY/139/19 V3		
No. of samples received	: 50		
No. of samples analysed	: 47		

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 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

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: 3644801)									
ES2114235-038	Anonymous	EA055: Moisture Content	----	0.1	%	5.3	5.1	3.82	0% - 20%
ES2114405-001	Anonymous	EA055: Moisture Content	----	0.1	%	26.9	26.3	2.21	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3638225)									
ES2114293-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0012	0.0012	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES2114376-020	1200_SD028_210415	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3638225)									
ES2114293-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3638225) - continued									
ES2114293-001	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
ES2114376-020	1200_SD028_210415	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3638225)									
ES2114293-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2114376-020	1200_SD028_210415	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3638225)									
ES2114293-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2114376-020	1200_SD028_210415	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3634783)									
ES2114376-012	1200_MW004_210415	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.15	0.15	0.00	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2114376-029	1200_SW075_210415	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3634783)									
ES2114376-012	1200_MW004_210415	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3634783) - continued									
ES2114376-012	1200_MW004_210415	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES2114376-029	1200_SW075_210415	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3634783)									
ES2114376-012	1200_MW004_210415	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2114376-029	1200_SW075_210415	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3634783)									
ES2114376-012	1200_MW004_210415	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2114376-029	1200_SW075_210415	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3634783)									
ES2114376-012	1200_MW004_210415	EP231X: Sum of PFAS	----	0.01	µg/L	0.25	0.25	0.00	0% - 20%
ES2114376-029	1200_SW075_210415	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.02	0.00	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: 3638225)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3638225)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	81.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3638225)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.8	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.7	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.2	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638225)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	77.6	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	79.6	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	74.4	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638225) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.8	69.2	143

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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3634783)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	89.8	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	91.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	106	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3639713)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	100	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	83.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	90.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3634783)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	96.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	106	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	94.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	86.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	94.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3639713)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	107	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	111	71.0	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: 3639713) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	119	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	98.0	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	98.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3634783)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	102	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	92.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	73.5	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	95.6	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3639713)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	99.5	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	80.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	93.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	118	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3634783)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	96.0	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	85.4	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	107	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	120	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3639713)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	90.8	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	82.8	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	136	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	144	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			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3638225)							
ES2114293-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	85.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	111	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	102	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	94.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	76.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	92.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3638225)							
ES2114293-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	89.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.0	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	89.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	93.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	101	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	103	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	115	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	103	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	95.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	98.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3638225)							
ES2114293-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	95.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	103	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	99.7	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	110	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	98.2	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	94.8	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	96.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638225)							
ES2114293-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	97.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	75.2	64.0	140

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638225) - continued							
ES2114293-001	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	84.4	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	73.2	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3634783)							
ES2114376-022	1200_MW012D_210415	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	90.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	98.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	92.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	72.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	83.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3634783)							
ES2114376-022	1200_MW012D_210415	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	86.4	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	89.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	95.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	96.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	96.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	88.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	93.0	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	93.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3634783)							
ES2114376-022	1200_MW012D_210415	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	95.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	93.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	80.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	92.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	95.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	93.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3634783)							

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: 3634783) - continued							
ES2114376-022	1200_MW012D_210415	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	90.6	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	101	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	97.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2114376**	Page	: 1 of 10
Client	: **AECOM Australia Pty Ltd**	Laboratory	: [redacted]
Contact	: [redacted]	Telephone	: [redacted]
Project	: [redacted]	Date Samples Received	: 19-Apr-2021
Site	: ----	Issue Date	: 28-Apr-2021
Sampler	: ----	No. of samples received	: 50
Order number	: 60612561	No. of samples analysed	: 47

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	37	5.41	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	37	2.70	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
1200_SD091_210415, 1200_SD086_210415, 1200_SD123_210415, 1200_SD001_210415, 1200_SD007_210415, 1200_SD028_210415, 1200_SD023_210415, 1200_SD059_210415, 1200_SD075_210415, 1200_QC103_210415	**15-Apr-2021**	**----**	----	----	**27-Apr-2021**	29-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
1200_SD091_210415, 1200_SD086_210415, 1200_SD123_210415, 1200_SD001_210415, 1200_SD007_210415, 1200_SD028_210415, 1200_SD023_210415, 1200_SD059_210415, 1200_SD075_210415, 1200_QC103_210415	**15-Apr-2021**	**23-Apr-2021**	12-Oct-2021	✓	**23-Apr-2021**	02-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
1200_SD091_210415, 1200_SD086_210415, 1200_SD123_210415, 1200_SD001_210415, 1200_SD007_210415, 1200_SD028_210415, 1200_SD023_210415, 1200_SD059_210415, 1200_SD075_210415, 1200_QC103_210415	**15-Apr-2021**	**23-Apr-2021**	12-Oct-2021	✓	**23-Apr-2021**	02-Jun-2021	✓

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
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
1200_SD091_210415, 1200_SD086_210415, 1200_SD123_210415, 1200_SD001_210415, 1200_SD007_210415, 1200_SD028_210415, 1200_SD023_210415, 1200_SD059_210415, 1200_SD075_210415, 1200_QC103_210415	**15-Apr-2021**	**23-Apr-2021**	12-Oct-2021	✓	**23-Apr-2021**	02-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
1200_SD091_210415, 1200_SD086_210415, 1200_SD123_210415, 1200_SD001_210415, 1200_SD007_210415, 1200_SD028_210415, 1200_SD023_210415, 1200_SD059_210415, 1200_SD075_210415, 1200_QC103_210415	**15-Apr-2021**	**23-Apr-2021**	12-Oct-2021	✓	**23-Apr-2021**	02-Jun-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
1200_SD091_210415, 1200_SD086_210415, 1200_SD123_210415, 1200_SD001_210415, 1200_SD007_210415, 1200_SD028_210415, 1200_SD023_210415, 1200_SD059_210415, 1200_SD075_210415, 1200_QC103_210415	**15-Apr-2021**	**23-Apr-2021**	12-Oct-2021	✓	**23-Apr-2021**	02-Jun-2021	✓

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_SW091_210415, 1200_MW021_210415, 1200_MW021D_210415, 1200_SW086_210415, 1200_MW018_210415, 1200_MW023_210415, 1200_SW123_210415, 1200_MW080_210415, 1200_MW004_210415, 1200_MW004D_210415, 1200_MW001_210415, 1200_SW001_210415, 1200_SW007_210415, 1200_MW012_210415, 1200_MW012D_210415, 1200_MW034_210415, 1200_SW059_210415, 1200_MW030_210415, 1200_SW075_210415	**15-Apr-2021**	**22-Apr-2021**	12-Oct-2021	✓	**22-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_QC100_210415, 1200_QC101_210415, 1200_QC102_210415, 1200_QC300_210415, 1200_QC301_210415, 1200_QC400_210415, 1200_QC500_210415	**15-Apr-2021**	**26-Apr-2021**	12-Oct-2021	✓	**26-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_MW029_210416, 1200_MW031_210416, 1200_MW032_210416, 1200_MW066_210416, 1200_MW112_210416, 1200_MW112_210416_FF, 1200_MW113_210416, 1200_MW113_210416_FF, 1200_QC302_210416, 1200_QC402_210416, 1200_QC501_210416	**16-Apr-2021**	**26-Apr-2021**	13-Oct-2021	✓	**26-Apr-2021**	13-Oct-2021	✓

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_SW091_210415, 1200_MW021_210415, 1200_MW021D_210415, 1200_SW086_210415, 1200_MW018_210415, 1200_MW023_210415, 1200_SW123_210415, 1200_MW080_210415, 1200_MW004_210415, 1200_MW004D_210415, 1200_MW001_210415, 1200_SW001_210415, 1200_SW007_210415, 1200_MW012_210415, 1200_MW012D_210415, 1200_MW034_210415, 1200_SW059_210415, 1200_MW030_210415, 1200_SW075_210415	**15-Apr-2021**	**22-Apr-2021**	12-Oct-2021	✓	**22-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_QC100_210415, 1200_QC101_210415, 1200_QC102_210415, 1200_QC300_210415, 1200_QC301_210415, 1200_QC400_210415, 1200_QC500_210415	**15-Apr-2021**	**26-Apr-2021**	12-Oct-2021	✓	**26-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_MW029_210416, 1200_MW031_210416, 1200_MW032_210416, 1200_MW066_210416, 1200_MW112_210416, 1200_MW112_210416_FF, 1200_MW113_210416, 1200_MW113_210416_FF, 1200_QC302_210416, 1200_QC402_210416, 1200_QC501_210416	**16-Apr-2021**	**26-Apr-2021**	13-Oct-2021	✓	**26-Apr-2021**	13-Oct-2021	✓

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_SW091_210415, 1200_MW021_210415, 1200_MW021D_210415, 1200_SW086_210415, 1200_MW018_210415, 1200_MW023_210415, 1200_SW123_210415, 1200_MW080_210415, 1200_MW004_210415, 1200_MW004D_210415, 1200_MW001_210415, 1200_SW001_210415, 1200_SW007_210415, 1200_MW012_210415, 1200_MW012D_210415, 1200_MW034_210415, 1200_SW059_210415, 1200_MW030_210415, 1200_SW075_210415	**15-Apr-2021**	**22-Apr-2021**	12-Oct-2021	✓	**22-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X) 1200_QC100_210415, 1200_QC101_210415, 1200_QC102_210415, 1200_QC300_210415, 1200_QC301_210415, 1200_QC400_210415, 1200_QC500_210415	**15-Apr-2021**	**26-Apr-2021**	12-Oct-2021	✓	**26-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X) 1200_MW029_210416, 1200_MW031_210416, 1200_MW032_210416, 1200_MW066_210416, 1200_MW112_210416, 1200_MW112_210416_FF, 1200_MW113_210416, 1200_MW113_210416_FF, 1200_QC302_210416, 1200_QC402_210416, 1200_QC501_210416	**16-Apr-2021**	**26-Apr-2021**	13-Oct-2021	✓	**26-Apr-2021**	13-Oct-2021	✓

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_SW091_210415, 1200_MW021_210415, 1200_MW021D_210415, 1200_SW086_210415, 1200_MW018_210415, 1200_MW023_210415, 1200_SW123_210415, 1200_MW080_210415, 1200_MW004_210415, 1200_MW004D_210415, 1200_MW001_210415, 1200_SW001_210415, 1200_SW007_210415, 1200_MW012_210415, 1200_MW012D_210415, 1200_MW034_210415, 1200_SW059_210415, 1200_MW030_210415, 1200_SW075_210415	**15-Apr-2021**	**22-Apr-2021**	12-Oct-2021	✓	**22-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_QC100_210415, 1200_QC101_210415, 1200_QC102_210415, 1200_QC300_210415, 1200_QC301_210415, 1200_QC400_210415, 1200_QC500_210415	**15-Apr-2021**	**26-Apr-2021**	12-Oct-2021	✓	**26-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_MW029_210416, 1200_MW031_210416, 1200_MW032_210416, 1200_MW066_210416, 1200_MW112_210416, 1200_MW112_210416_FF, 1200_MW113_210416, 1200_MW113_210416_FF, 1200_QC302_210416, 1200_QC402_210416, 1200_QC501_210416	**16-Apr-2021**	**26-Apr-2021**	13-Oct-2021	✓	**26-Apr-2021**	13-Oct-2021	✓

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_SW091_210415, 1200_MW021_210415, 1200_MW021D_210415, 1200_SW086_210415, 1200_MW018_210415, 1200_MW023_210415, 1200_SW123_210415, 1200_MW080_210415, 1200_MW004_210415, 1200_MW004D_210415, 1200_MW001_210415, 1200_SW001_210415, 1200_SW007_210415, 1200_MW012_210415, 1200_MW012D_210415, 1200_MW034_210415, 1200_SW059_210415, 1200_MW030_210415, 1200_SW075_210415	**15-Apr-2021**	**22-Apr-2021**	12-Oct-2021	✓	**22-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_QC100_210415, 1200_QC101_210415, 1200_QC102_210415, 1200_QC300_210415, 1200_QC301_210415, 1200_QC400_210415, 1200_QC500_210415	**15-Apr-2021**	**26-Apr-2021**	12-Oct-2021	✓	**26-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X)							
1200_MW029_210416, 1200_MW031_210416, 1200_MW032_210416, 1200_MW066_210416, 1200_MW112_210416, 1200_MW112_210416_FF, 1200_MW113_210416, 1200_MW113_210416_FF, 1200_QC302_210416, 1200_QC402_210416, 1200_QC501_210416	**16-Apr-2021**	**26-Apr-2021**	13-Oct-2021	✓	**26-Apr-2021**	13-Oct-2021	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**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	1	37	**2.70**	**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	: **EB2110991**	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	: 21-Apr-2021 09:15
Order number	: 60612561	Date Analysis Commenced	: 23-Apr-2021
C-O-C number	: ----	Issue Date	: 05-May-2021 11:51
Sampler	[redacted]		
Site			
Quote number	: SY/139/19 V3		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
	2IC 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.
- Amendment 1 (05/05/2021):This report has been amended following the request to change Project ID. All analysis results are as per the previous report
- EP231X-INJ PFAS by LCMSMS: Sample '1200_QC201_210415' has been tested to the legacy QSM 5.1 aligned, NATA accredited method due to sample matrix being unsuitable for SPE extraction (high sediment content).
- 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: SOIL (Matrix: SOIL)				Sample ID	1200_QC203_210415	----	----	----	----
				Sampling date / time	15-Apr-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2110991-004	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**16.6**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1200_QC203_210415	----	----	----	----
				Sampling date / time	15-Apr-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2110991-004	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**98.5**	----	----	----	----
13C8-PFOA	----	0.0002	%		**94.0**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC200_210415	1200_QC201_210415	1200_QC202_210415	----	----
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2110991-001	EB2110991-002	EB2110991-003	--------	--------
					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	0.02	µg/L		----	**0.03**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**0.17**	----	----	----
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	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	**0.02**	----	----
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	0.10	µg/L		----	<0.10	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**0.04**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**0.03**	----	----	----
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_210415	1200_QC201_210415	1200_QC202_210415	----	----
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2110991-001	EB2110991-002	EB2110991-003	--------	--------
					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	----	----
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	----	----	----
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_210415	1200_QC201_210415	1200_QC202_210415	----	----
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2110991-001	EB2110991-002	EB2110991-003	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	----	----	----
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	----	----
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		----	**0.27**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	1200_QC200_210415	1200_QC201_210415	1200_QC202_210415	----	----
				Sampling date / time	15-Apr-2021 00:00	15-Apr-2021 00:00	15-Apr-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2110991-001	EB2110991-002	EB2110991-003	--------	--------
					Result	Result	Result	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**----**	**0.20**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**----**	**0.27**	**----**	**----**	**----**
Sum of PFAS	----	0.01	µg/L		<0.01	**----**	**0.02**	**----**	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**----**	**0.02**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**----**	**0.02**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.5**	**----**	**97.2**	**----**	**----**
13C4-PFOS	----	0.02	%		**----**	**112**	**----**	**----**	**----**
13C8-PFOA	----	0.02	%		**86.1**	**----**	**85.9**	**----**	**----**
13C8-PFOA	----	0.02	%		**----**	**108**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131

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	: **EB2110991**	Page	: 1 of 11
Amendment	: **1**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: [redacted]
Contact	: [redacted]	Contact	:
Address	:	Address	:
Telephone	: ----	Telephone	:
Project	: NT_1200_PFASOMP	Date Samples Received	: 21-Apr-2021
Order number	: 60612561	Date Analysis Commenced	: 23-Apr-2021
C-O-C number	: ----	Issue Date	: 05-May-2021
Sampler	: [redacted]		
Site	: ----		
Quote number	: SY/139/19 V3		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
	2IC 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

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: 3637969)									
EB2110947-004	Anonymous	EA055: Moisture Content	----	0.1	%	30.4	31.4	3.26	0% - 20%
EB2110967-017	Anonymous	EA055: Moisture Content	----	0.1	%	14.7	15.2	3.23	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3637967)									
EB2110947-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB2110967-017	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0006	0.0007	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0114	0.0108	5.88	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0008	0.0008	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3637967)									
EB2110947-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3637967) - continued									
EB2110947-004	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EB2110967-017	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	0.0003	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0012	0.0013	11.1	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0021	0.0026	24.0	0% - 50%
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	0.0002	0.0003	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.0006	19.3	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3637967)									
EB2110947-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB2110967-017	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3637967)									
EB2110947-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB2110967-017	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3643072)									
EB2110967-093	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	32.3	30.8	4.80	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.77	0.78	1.59	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.00	0.95	4.52	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	7.48	6.87	8.46	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.59	0.59	0.00	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.04	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3652271)									
EB2110991-002	1200_QC201_210415	EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.17	0.17	0.00	0% - 50%
		EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3643072)									
EB2110967-093	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.54	0.57	4.35	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3643072) - continued									
EB2110967-093	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.32	0.33	4.25	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.82	1.82	0.00	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.17	0.16	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.13	<0.11	16.4	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.3	<0.2	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3652271)									
EB2110991-002	1200_QC201_210415	EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	<0.10	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3643072)									
EB2110967-093	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.05	<0.04	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.13	<0.11	16.4	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.13	<0.11	16.4	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.13	<0.11	16.4	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.13	<0.11	16.4	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3652271)									
EB2110991-002	1200_QC201_210415	EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3652271) - continued									
EB2110991-002	1200_QC201_210415	EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3643072)									
EB2110967-093	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.07	0.08	14.1	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3652271)									
EB2110991-002	1200_QC201_210415	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3643072)									
EB2110967-093	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	45.1	43.0	4.79	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	39.8	37.7	5.45	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	43.5	41.4	4.85	0% - 20%
EP231P: PFAS Sums (QC Lot: 3652271)									
EB2110991-002	1200_QC201_210415	EP231X-INJ: Sum of PFAS	----	0.01	µg/L	0.27	0.27	0.00	0% - 20%
		EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.20	0.20	0.00	0% - 20%
		EP231X-INJ: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.27	0.27	0.00	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3637967)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	88.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00117 mg/kg	83.3	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	83.5	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	85.3	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	82.3	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	83.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3637967)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.5	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.8	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3637967)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.4	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.7	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.4	61.9	137
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3637967)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	86.3	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	94.1	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	99.2	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3637967) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	106	54.8	124

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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3643072)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	86.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	95.9	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.2373 µg/L	88.7	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	76.5	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	103	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	83.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3652271)								
EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.444 µg/L	90.3	72.0	130
EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.47 µg/L	87.2	71.0	127
EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.475 µg/L	83.4	68.0	131
EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.477 µg/L	81.1	69.0	134
EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.4646 µg/L	94.0	65.0	140
EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	90.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3643072)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.3	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	77.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	81.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	76.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	78.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	80.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	78.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	72.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	78.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3652271)								
EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	2.5 µg/L	77.5	73.0	129
EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	82.2	72.0	129
EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	79.2	72.0	129
EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	83.8	72.0	130
EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	78.0	71.0	133
EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	77.4	69.0	130
EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	86.0	71.0	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: 3652271) - continued								
EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	80.6	69.0	133
EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	75.6	72.0	134
EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	75.8	65.0	144
EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	91.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3643072)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	84.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	83.1	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	79.7	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.6	62.6	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	78.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3652271)								
EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	85.8	67.0	137
EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	88.6	68.0	141
EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	84.4	62.1	136
EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	90.1	65.2	135
EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.2	63.2	135
EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	97.8	65.0	136
EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	106	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3643072)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	78.3	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	91.0	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	101	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	80.3	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3652271)								
EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.469 µg/L	87.8	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	77.5	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	101	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	101	62.2	139

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 3643072)								
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: 3652271)								
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: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3637967)							
EB2110947-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	85.9	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	79.9	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	79.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	81.9	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	87.5	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	75.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3637967)							
EB2110947-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	77.7	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	76.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	80.4	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	82.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	78.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	80.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	79.2	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	85.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	82.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	86.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	91.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3637967)							
EB2110947-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	95.6	48.0	128

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3637967) - continued							
EB2110947-006	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	82.5	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	82.4	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	73.7	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	96.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	73.2	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	78.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3637967)							
EB2110947-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	84.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	78.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	95.8	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	92.9	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB2110991**	Page	: 1 of 5
Amendment	: **1**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: [redacted]
Contact	[redacted]	Telephone	: [redacted]
Project	: NT_1200_PFASOMP	Date Samples Received	: 21-Apr-2021
Site	: ----	Issue Date	: 05-May-2021
Sampler	: [redacted]	No. of samples received	: 4
Order number	: 60612561	No. of samples analysed	: 4

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **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	1	12	8.33	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	12	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation* ***Date extracted***	*Due for extraction*	*Evaluation*	*Analysis* ***Date analysed***	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) 1200_QC203_210415	**15-Apr-2021**	**----**	----	----	**23-Apr-2021**	29-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) 1200_QC203_210415	**15-Apr-2021**	**27-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	06-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) 1200_QC203_210415	**15-Apr-2021**	**27-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	06-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 1200_QC203_210415	**15-Apr-2021**	**27-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	06-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 1200_QC203_210415	**15-Apr-2021**	**27-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	06-Jun-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 1200_QC203_210415	**15-Apr-2021**	**27-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	06-Jun-2021	✓

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*

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_210415,	1200_QC202_210415	**15-Apr-2021**	**29-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X-INJ)								
1200_QC201_210415		**15-Apr-2021**	**30-Apr-2021**	12-Oct-2021	✓	**30-Apr-2021**	12-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
1200_QC200_210415,	1200_QC202_210415	**15-Apr-2021**	**29-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X-INJ)								
1200_QC201_210415		**15-Apr-2021**	**30-Apr-2021**	12-Oct-2021	✓	**30-Apr-2021**	12-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
1200_QC200_210415,	1200_QC202_210415	**15-Apr-2021**	**29-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X-INJ)								
1200_QC201_210415		**15-Apr-2021**	**30-Apr-2021**	12-Oct-2021	✓	**30-Apr-2021**	12-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
1200_QC200_210415,	1200_QC202_210415	**15-Apr-2021**	**29-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X-INJ)								
1200_QC201_210415		**15-Apr-2021**	**30-Apr-2021**	12-Oct-2021	✓	**30-Apr-2021**	12-Oct-2021	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
1200_QC200_210415,	1200_QC202_210415	**15-Apr-2021**	**29-Apr-2021**	12-Oct-2021	✓	**29-Apr-2021**	12-Oct-2021	✓
HDPE (no PTFE) (EP231X-INJ)								
1200_QC201_210415		**15-Apr-2021**	**30-Apr-2021**	12-Oct-2021	✓	**30-Apr-2021**	12-Oct-2021	✓

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	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**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	1	12	**8.33**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	12	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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.
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
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.
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.

Appendix G

Calibration Certificate

ROBERTSON BARRACKS

AECOM Imagine it. Delivered.

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

+61 8 8942 6200 tel
+61 8 8942 6299 fax
ABN 20 093 846 925

Equipment Information

Instrument:

Serial Number:

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 25.8	±0.2°C	☑	☐
Dissolved Oxygen	☑ 100% Saturation	±2%	☑	☐
	Pressure Compensation	____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	± 0.2	☑	☐
	☑ pH 10		✓	
ORP	☑ 216 mV at 26 °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: 15/4/2021 8:50

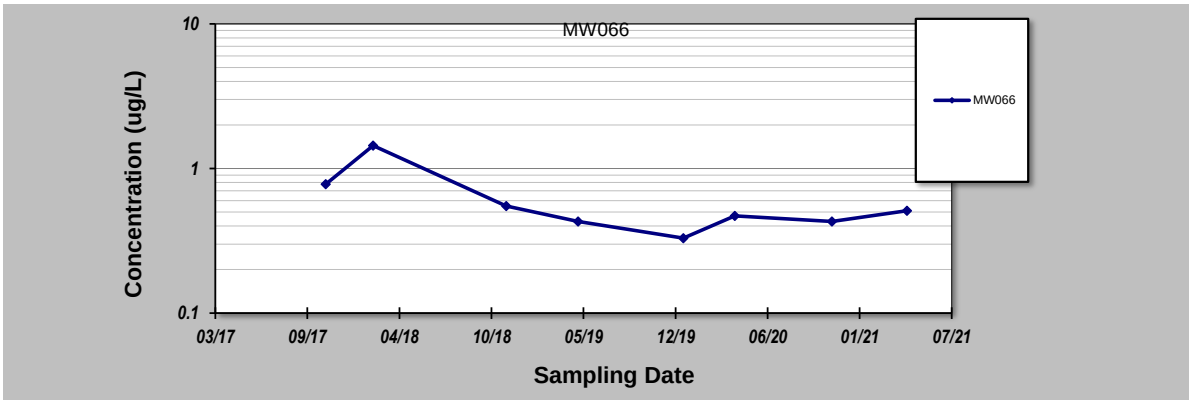
Appendix F

Statistical Analysis

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	13-Jul-21	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFHxS+PFOS
Conducted By:	[redacted]	Concentration Units:	ug/L
Sampling Point ID:	MW066		

Sampling Event	Sampling Date	PFHXS+PFOS CONCENTRATION (ug/L)
1	1-Nov-17	0.78
2	12-Feb-18	1.44
3	28-Nov-18	0.55
4	3-May-19	0.43
5	18-Dec-19	0.33
6	7-Apr-20	0.47
7	4-Nov-20	0.43
8	16-Apr-21	0.51
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		0.17
Mann-Kendall Statistic (S):		0
Confidence Factor:		39.3%
Concentration Trend:		Stable



Notes:

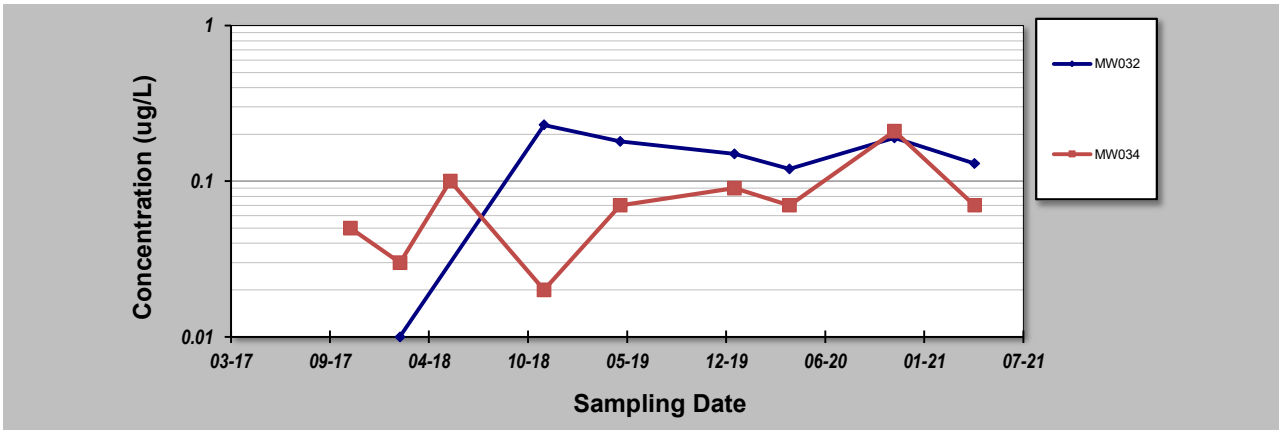
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably 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.

60612561
Mann-Kendall Statistical Analysis
PFAS Ongoing Monitoring Program
Department of Defence - Robertson Barracks

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	13-Jul-21	Job ID:	60612561
Facility Name:	AECOM Australia Pty Ltd	Constituent:	PFOA
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW032	MW034					
Sampling Event	**Sampling Date**	**PFOA CONCENTRATION (ug/L)**					
1	2-Nov-17		0.050				
2	10-Feb-18	0.010	0.030				
3	23-May-18		0.100				
4	28-Nov-18	0.230	0.020				
5	1-May-19	0.180	0.070				
6	18-Dec-19	0.150	0.090				
7	7-Apr-20	0.120	0.070				
8	4-Nov-20	0.190	0.210				
9	15-Apr-21	0.130	0.07				
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
Coefficient of Variation:		0.49	0.70				
Mann-Kendall Statistic (S):		-1	11				
Confidence Factor:		50.0%	84.6%				
Concentration Trend:		Stable	No Trend				



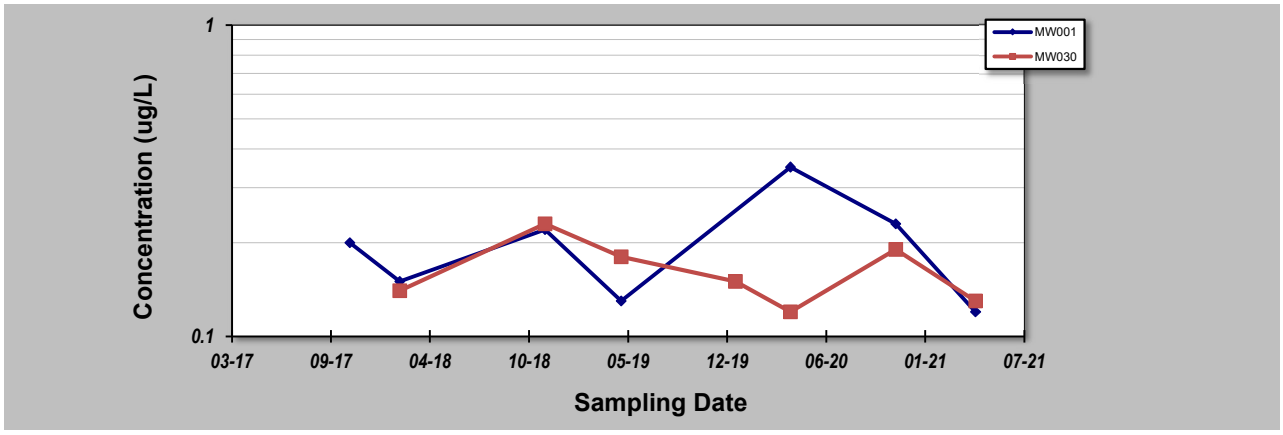
Notes:

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.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	31-Aug-21	Job ID:	60612561
Facility Name:	Robertson Barracks	Constituent:	PFOS+PFHxS
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	MW001	MW030					
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	30-Oct-17	0.2						
2	8-Feb-18	0.15	0.14					
3	28-Nov-18	0.22	0.23					
4	1-May-19	0.13	0.18					
5	18-Dec-19		0.15					
6	7-Apr-20	0.35	0.12					
7	5-Nov-20	0.23	0.19					
8	15-Apr-21	0.12	0.13					
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.44	0.24					
Mann-Kendall Statistic (S):		-2	-5					
Confidence Factor:		59.2%	71.9%					
Concentration Trend:		Stable	Stable					



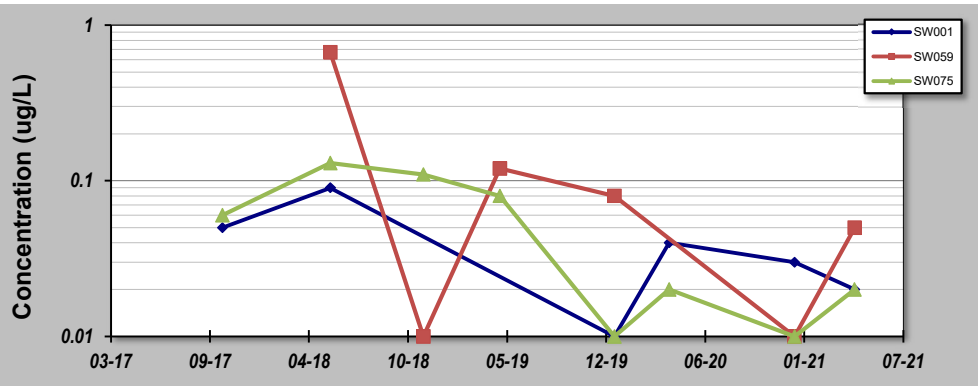
Notes:

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.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	31-Aug-21	Job ID:	60612561
Facility Name:	Robertson Barracks	Constituent:	PFOS+PFHxS
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	SW001	SW059	SW075				
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	17-Oct-17	0.05		0.06				
2	23-May-18	0.09	0.67	0.13				
3	27-Nov-18		0.01	0				
4	30-Apr-19		0.12	0				
5	18-Dec-19	0.01	0.08	0.01				
6	6-Apr-20	0.04		0				
7	15-Dec-20	0.03	0.01	0.01				
8	15-Apr-21	0.02	0.05	0.02				
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.52	1.63	0.86				
Mann-Kendall Statistic (S):		0	-6	-14				
Confidence Factor:		37.5%	81.5%	94.6%				
Concentration Trend:		Stable	No Trend	Prob. Decreasing				



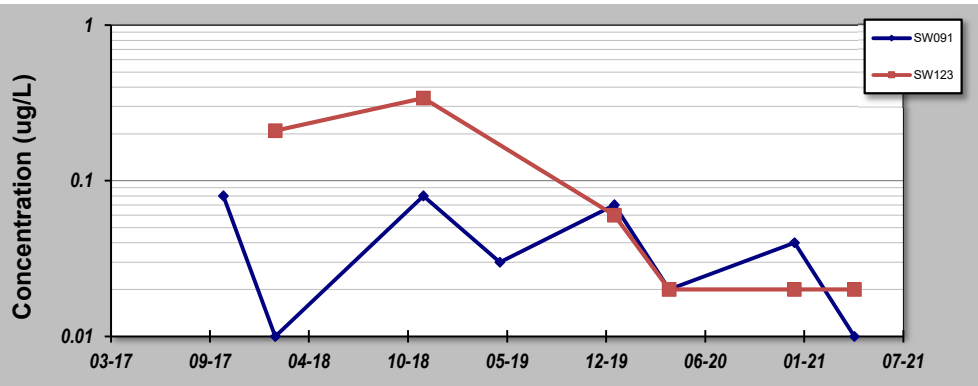
Notes:

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.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	31-Aug-21	Job ID:	60612561
Facility Name:	Robertson Barracks	Constituent:	PFOS+PFHxS
Conducted By:	[redacted]	Concentration Units:	ug/L

Sampling Point ID:	SW091	SW123					
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	19-Oct-17	0.08						
2	1-Feb-18	0.01	0.21					
3	27-Nov-18	0.08	0.34					
4	30-Apr-19	0.03						
5	18-Dec-19	0.07	0.06					
6	6-Apr-20	0.02	0.02					
7	15-Dec-20	0.04	0.02					
8	15-Apr-21	0.01	0.02					
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.67	1.20					
Mann-Kendall Statistic (S):		-9	-10					
Confidence Factor:		93.2%	95.2%					
Concentration Trend:		Prob. Decreasing	Decreasing					



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.
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